NeXTWORLD — VOL. 1 1991

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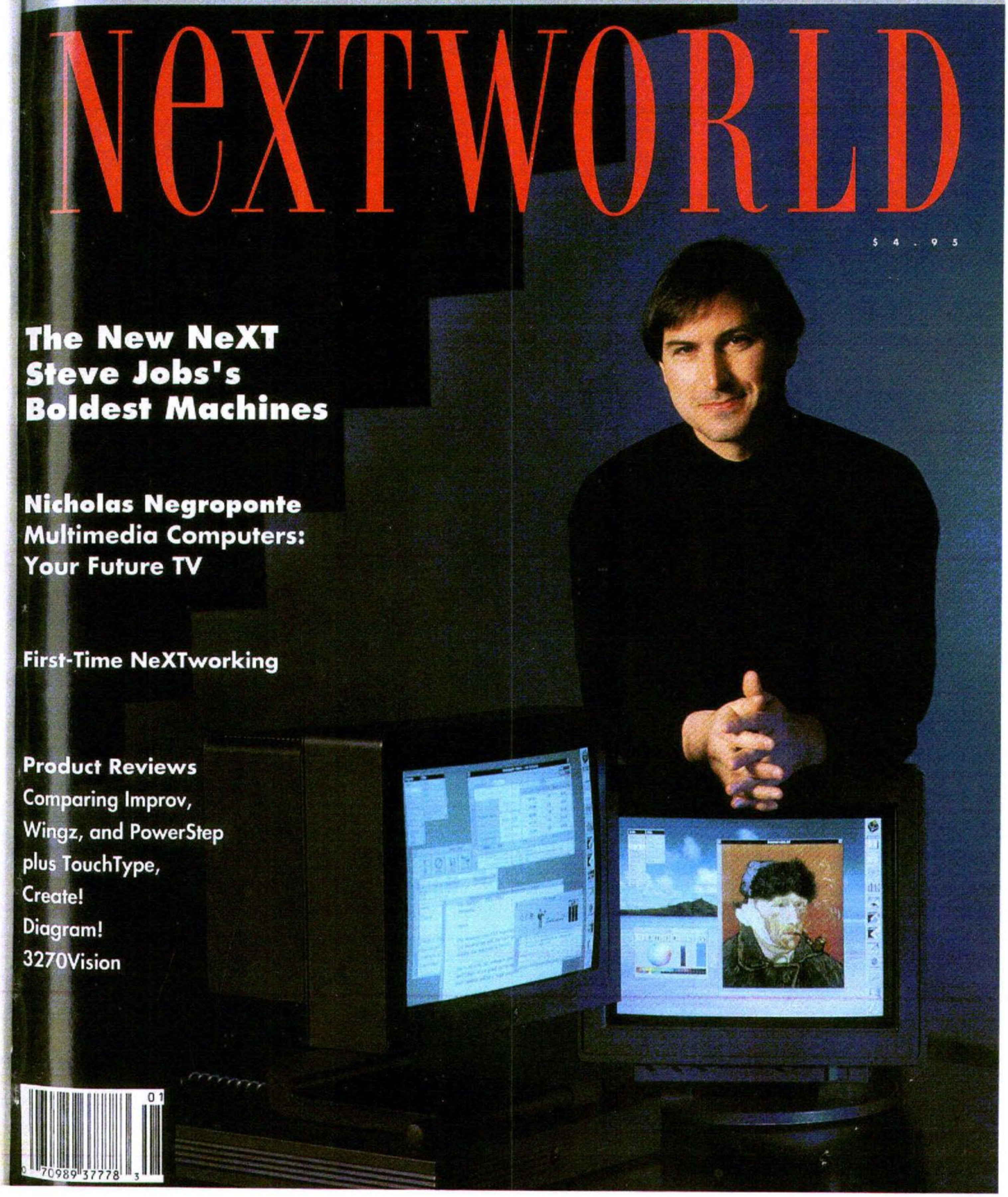

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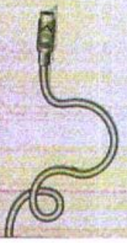

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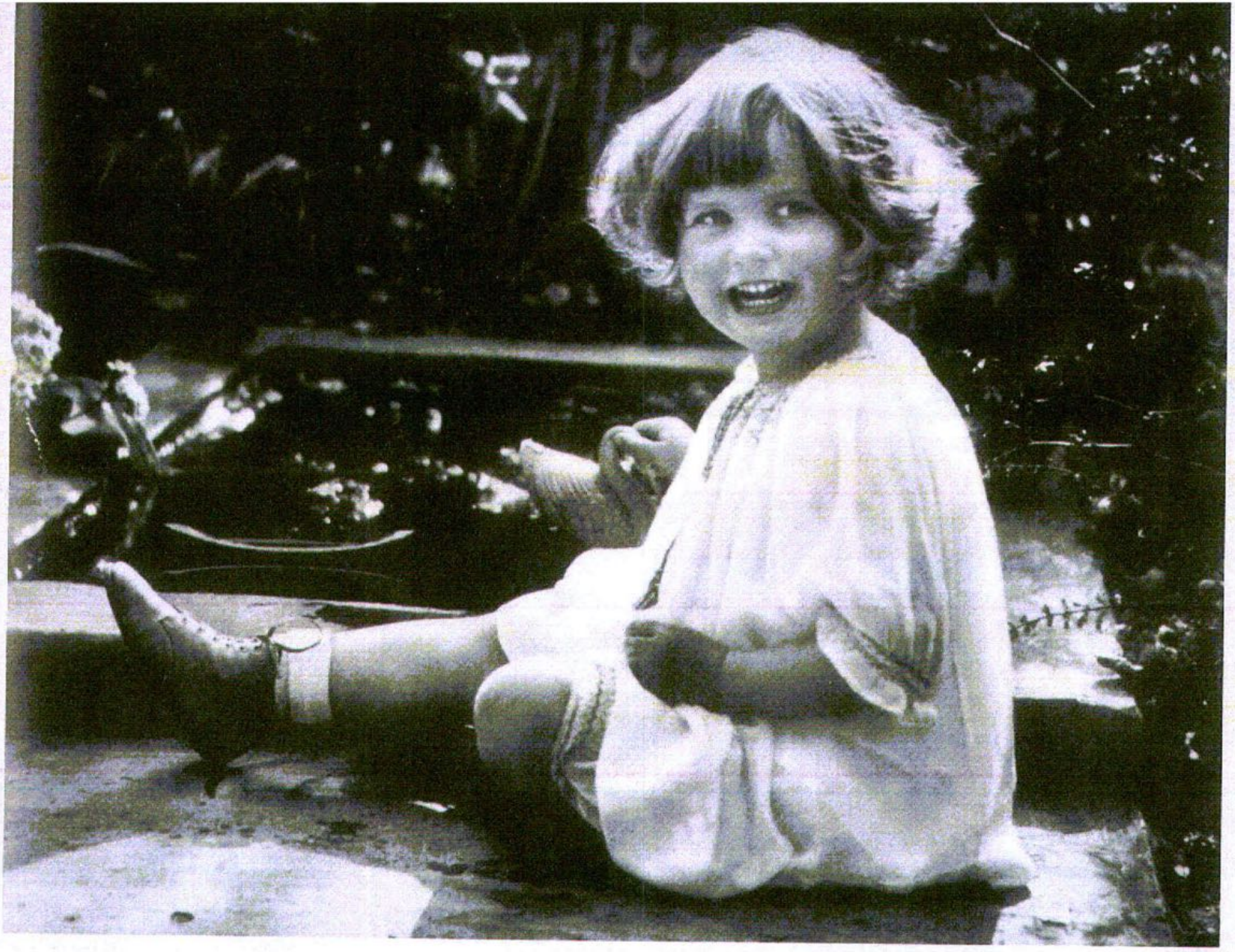

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GET INTO NEXTWORLD!

GET OUT OF THIS WORLD SAVINGS

Photography/Mary Merrick

Black Box/Michael Miley

Welcome to the NeXT world. So glad you could come. Take a look around, then pull up a chair and make yourself at home. You may need a small orientation.

For starters, you may not have a map of the road that got you here, and you're just a bit bewildered by the unfamiliar terrain. What is this magazine? Is *NeXTWORLD*, as its name might imply, some new age rag invoking the afterlife, masquerading in computer dress? It certainly looks a bit otherworldly. The black machines photographed inside bear no resemblance to any you've set your hands on, and the pages aren't littered like the usual product dumpsite once known as a user magazine.

What you have in your hands is a magazine that spans two worlds, worlds that are already making an impact on *your* world. The first is the world of NeXT, a computer family that operates at the forefront of the world of microcomputer technology. The second is the wider world of Information Technology *IT*self, both the "news" variety—print and its digital equivalents, the worldwide information networks—and the "entertainment" variety—television, film, music, and video. The NeXT intersects with this wider world and, in the future, will act as a control center for it. *NeXTWORLD* is both a NeXT user magazine and one that takes the deeper view of IT, showing the ways that IT has entered into your homes, gotten under your skin, and begun to change your future.

Both a new computer *and* a new computer magazine? Why in either world does the world need either? Let's spin both globes and see where we wind up.

Why does the world need another computer? I myself asked this question of Steve Jobs, president of NeXT Computer, in a recent conversation we had in his sleek boardroom at NeXT in Redwood City. As he sat down, I thought he looked a bit professorial, with the beard and Lennon glasses he wore at the time, as if he'd prepared for a lecture. Fact is, Jobs is relentless, like a train traveling down a mountain: always on track, always looking ahead, but always moving at a terrific velocity. You don't talk to Jobs, you listen. I listened. Here, with some dressing up, is the gist of what he said.

The world has lots of computers, but not many *kinds* of computers. Think of it as a technological playground where the many kids on the swings come in only a few shapes. Setting aside mainframes and supercomputers for the moment, Jobs identified four types, each representing one wave of the microcomputer revolution: the IBM PC and its clones, the Apple Macintosh, the Sun workstation, and the NeXT.

The IBM PC and its clones represent the first type: character-based personal computers running the single-tasking DOS operating system. Call it: the Character. Historically identified with basic business applications such as spreadsheets (Lotus 1-2-3), databases (dBase), and word processors (WordPerfect), the Character is tough to get to know, given the fact that you have to remember commands to run its programs, and no program resembles another. Since it's a single-tasking machine, moreover, you have to quit one of its programs to start up another, and the new graphical mask put on its face, called Windows, doesn't really cut it. Imagine it: the Character, doing Windows. Funny Character. Can't get 'em clean.

The Apple Macintosh is the second type. Call it: Pretty Face. Pretty Face revolutionized the personal computer interface with its graphical approach: pull-down menus and icons representing files, folders, and applications on a desktop. What's more, Pretty Face set guidelines across the board, so that what you learned in one program could be applied to another. With Pretty Face's approach came graphics programs (MacDraw, Illustrator) and the notion of WYSIWYG applications: What you see on your screen is what you get in your printout. And with its page layout programs (like PageMaker), Pretty Face launched the desktop publishing revolution—but fell down when it tried to play round robin with other Pretty Faces. The networking software, AppleTalk, built into every Pretty Face, bogs down under intensive use, even in the DTP arena where it's famous. Pretty Face then shows a sad face—not a pretty sight.

The third type is the workstation, exemplified by Suns. Call it: the Alien. The Alien operates basically as a highly intelligent multitasking terminal on a network set up for workgroups. Up until now, the Alien has been used primarily by people such as engineers, designers, architects, and scientists, running custom-made applications. More powerful and expensive than a personal computer, the Alien is a bit difficult to use. For one thing, its language is hard to decipher. Using a network operating system like UNIX, the Alien is tough enough to handle many tasks in a multitasking environment, but it requires people who know how to speak its language for setup and maintenance. Mere mortals get strange when they hang around the Alien for too long. Bug-eyed.

The fourth type is the NeXT. Call it: the Mind Reader. Its goal is to be as accommodating as Pretty Face, with all its pretty off-the-shelf applications, while at the same time giving you all the power of an Alien with none of the pain. Mind Readers run on UNIX (which makes them multitasking) and have Ethernet built in (see our Special Report in this issue, "The New NeXT," for an explanation of these capabilities), but Mind Readers hide the network's complexity from you. A Mind Reader knows what you need. Everything's up its sleeve, where you don't have to see it. Just pull what you want out of its hat. And its system software is designed from the start to facilitate doing groupwork on a network. Deep in its brain is a multimedia e-mail program that lets you message many people at once, and include in your message files from word processors, graphics programs, fax transmissions, and voiceprints. You get pretty clairvoyant when you use the Mind Reader for any length of time.

In short, unlike a personal computer, the NeXT is made from the ground up for *collaborative computing,* and unlike a workstation, it's easy to use. It's an *interpersonal computer,* the first of its kind.

This (minus my naming conventions) was Steve Jobs's message that day. It was a message meant to remind me of my microcomputer roots, a kind of lesson in evolution. From Jobs's standpoint, it all points to the NeXT—as inheritor of all the gains of the microcomputer revolution and the progenitor of their future.

But our second riddle remains to be solved. Question is, can such an act of memory both remind us of our future and act as a charter for a new computer magazine?

Why does the world need another computer magazine? In an apocalyptic parable of mine I've been musing over, memory is an archive in a near-perfect computer. The archive stores the original purposes for which that computer was made—only no one cares to retrieve them, since the impulse to do so has long since atrophied in the collective mind. As an ironic device, the plot is too simple for more than a passing mention, and it's also simplistic for another reason. This magazine, the one you're holding, is a more elaborate testament to the recovery of lost meanings.

Let's conduct a simulation. Imagine in place of my bleak, ironic tale, a magazine on IT that continually reminds you of the reasons for which IT's made. Its purpose is not simply to provide an outlet for NeXT user stories (though we like users and we will be profiling them), nor is it just a catalog of techniques and technologies (though it's not without both), nor is it simply a rodeo of product shoot-outs where the defeated dead return each month to be shot down again (we like product comparisons, but we'll think of less murderous metaphors). The key to this magazine is that it should explore the nature of the symbiotic relationship of people to IT, that "intimate living together of two dissimilar organisms in a mutually beneficial relationship" (Webster, not Bruce, but Digital) that constitutes life with IT, and that has been going on for quite some time, right under our noses. Imagine, then, conducting that exploration from the vantage point of a computer that will act like an engine for the mind in the future world of IT.

So far, so good. Since the magazine deals with the next generation of IT, call it *NeXTWORLD,* with the implication that NeXT computers share a future with us. Now do something radical. Whenever you discuss a specific technology, keep it in the context of human tasks. Take a hard look, then, at the present to see if the brave new world of IT that's being shaped before your eyes is the one "dreamt of in your philosophy." If it isn't, say so, and say why. Give a cogent analysis of the monster, if IT's a monster. If IT's a Frankenstein, don't be afraid to pull the plugs out of IT's neck.

How's our simulation doing? Are all the chips in place? Not quite. Presume, then, that this magazine does all that a magazine needs to do for its first cybernetic tribe, its NeXT users, but that it also puts the original creative thinking back into the discussion of techniques and technologies. Think of it: a recovery of *reflection* in a magazine about computers. Think of this, too: a recovery of *discernment* in a magazine about IT, so it's not just an intellectual smorgasbord. Since computers have gotten into our minds like no other electronic device since the television, one project for this magazine is to look into the mind and explore the model of ourselves that we've embodied in these machines. As computers become more human, is the human psyche becoming more computerized?

So aside from a core of NeXT-based features, user and corporate profiles, and product reviews, look for articles that discuss the nature of the self and of work in a computerized society. Imagine also columns discussing the computer as TV, the TV as computer (see Nicholas Negroponte in "Vanishing Point" in this issue). And look for articles on computers and the Internet, on hackers fighting agents of the FBI, on mass media and the vanishing notion of *evidence,* as well as articles about William Gibson and cyberspace, computer visualization, and virtual reality.

End of simulation. That's it. That's your magazine. Let's print it out and look it over. Looks like only one thing remains: to devote one issue, our premiere, to a more complete answer to our key first question, Why does the world need a NeXT computer? We'll reserve future issues for an answer to the second, Why *NeXTWORLD*? If simulation means anything, IT'll grow clearer and more real.

Michael Miley *is editor-in-chief of* NeXTWORLD.

Photography/Bob Sacha

Living Technology/Hazel Kahan

It's been ten years since the personal computer burst onto the market, ten years since the computer became a self-sufficient, liberated machine, rather than one umbilically connected to a mother mainframe. In those ten years, millions of eyes around the world have stared at innumerable screens, while fingers, pecking dutifully on keyboards, have filled these screens with words, numbers, and pictures.

You would think by now we'd all be used to computers.

But the fact is, they still inspire admiration or revulsion, and rarely do you find a person who, after having had anything to do with them, is indifferent to them. Familiarity has not bred contempt. Just try separating people from their PCs, even the ones who've had an uneasy marriage to them. You may find toothmarks on your hand. Lovers should be this faithful.

For those of us who see the computer as more than a mere instrument, the affair deepens with familiarity, warms as our expertise evolves, and blossoms as we grab new applications the moment they come to our attention. The heady addiction that began during our earliest encounters was not produced by fad or gimmick. We did not grow out of it. We grew into it. We grew because of it. And, as grown-ups, we still find ourselves in heated discussions, defending our use of it, even when the uninitiated complain that, well, things were more personal back when the personal computer was a mere twinkle in Apple's eye.

How can we account for such passion?

Computers have brought philosophy back into daily life. Thinking about what computers do raises questions both ancient and new. What is the mind? What is life? What is artificial? What is reality? The debates are not made less interesting by the indignation some feel for the computer as a model of human intelligence and for the gross injustice that model does to that which is essentially human in us: our sense of morality, justice, and humor; our feelings and insights. The idea that a human mind could be reduced to a set of procedures and rules seems preposterous to common sense—yet there are those whose brilliant reasoning would take it that far. That's the point. Computers seduce us into such hyperbole and fling us into such debates.

Computers demand that we compose a new language. When people push the limits of their understanding, they're likely to create new words to describe their experiences. Hence, in twentieth-century philosophy we have the neologisms of Wittgenstein, Heidegger, and Sartre. In computer circles, you hear words like *artificial intelligence* (or *artificial intelligencia*, if you're an AI cynic), *virtual reality, hyperspace, time-shifting*—sources of both wonder and revenue to media analysts, and of consternation to purists of the Queen's English. But a language that changes, even in ungainly ways, is a language that lives. Under the press of discussing computers, creative things happen to language.

Computers allow us to both simulate and transcend reality. The concepts here are artificial intelligence. Artificial life. Networks that imitate the neural exchange of the central nervous system. Alternative universes made up of mathematically perfect creatures and environments that we ourselves create. These are not the fantasies just of hackers who've been cooped up too long in front of a glowing screen, but of computer scientists and philosophers preoccupied with notions of creation and re-creation—re-creation of the world they can see and creation of worlds they can't.

Indeed, computers allow us to transcend common notions of time and space. We're not talking here about the impulses of a few science fiction writers. We're talking about the basic desires of your everyday citizen. Americans, by way of an old example, have been in love with cars ever since the Model T was mass-produced. This love is based on the extension of physical performance the car permits; it is the Earth-bound answer to the dream of flying. The car allows people to ignore the limitations of their own physical abilities and to become something bigger, faster, more powerful.

Computers are doing the same thing for our minds. It sounds grandiose until you've done it. When we connect with other people and remote databases, anytime, anywhere, the size of the globe does not intimidate us, and we grow wings to fly wherever we wish. We enter worlds of color and dimensions and speeds and scenarios that would never be available to us otherwise. And when we come back from those worlds, we come back nourished, invigorated, and a bit dizzy. Simulations are good for the soul. Transcending time and space is not too bad for it either.

Using computers changes who we are. We haven't begun to fathom the long-term effects that computers can have on the way a person perceives and leads his or her life. The intense, everyday interaction has created a new entity, a symbiotic I-and-thou computer that was never there before. When a person sits down in front of a computer, a ritual centering occurs, which has replaced what was once felt as a kind of disorientation, a loss of contact with one's work. Now, sitting down to the computer means getting into one's work, being entranced with it, entering a special world for the mind.

And each time we enter that world, we are changed. We grow more courageous because we expand our sense of what is possible. We experience what it is like to change our minds without fear of undue penalty. We discover we can write, paint, calculate, draw, and see in ways we never knew we could, an expansion that spills over into activities that have nothing to do with computers. We grow not only in what we think we can do, but in what we can imagine.

It all sounds a bit weird, and outsiders smile with indulgence when we talk this way. But they've never experienced the power, pleasure, and self-knowledge the computer affords. It's an intriguing thought that computers help us acquire self-knowledge, but the fact is, computers help us measure our own mastery of tasks more easily. The computer, through its personalized interface, can record our own learning curves in mastering a piece of software. (Future software will learn along with us.) In fact there are no limits; we can go as far as our imaginations take us. And because there is more than enough for all, we're exempt from competition. One person's gain is never at another person's expense, and we can share our mastery without blunting our own advantage.

We're citizens of a newly created, interconnected world. We can create our own personal world, but then we necessarily find ourselves sharing it with others. After the decade of the personal computer, this is the emerging meaning of interpersonal computing: individuals fulfilling themselves in the group. On a local area network, one invariably finds that he or she is part of a team working for common goals, and with the networked computer, work can easily be shared with others. We can trade information back and forth in a way that wasn't possible when everyone was confined to paper.

What's more, connection to the wider world is just a modem away. On-line services let us send messages or conference with a whole group of people we've never seen. It's no accident that on-line addicts who spend all their time in electronic conferences experience a feeling of connectedness that is independent of the body. On line, mind speaks to mind without sound, interacting in a meta-realm where different rules apply, where language has a different syntax, and where physical and social distinctions are wiped out. In this dimension, there is true interoperability; that is, we are all operating on the same platform, under the same architecture, in a true community of shared interests.

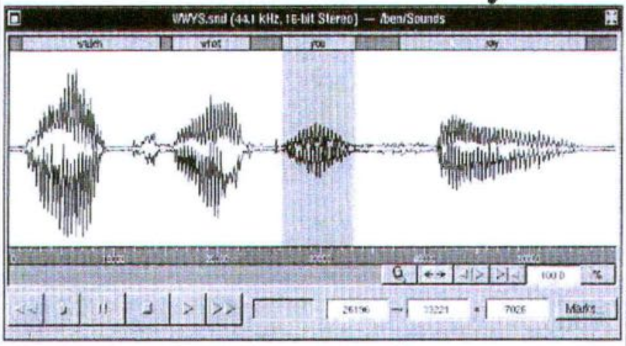
This on-line world is available to more and more of us each day. The expanding interconnection is breaking down boundaries of both geography and culture. The promise is that with access for all, this interconnectedness will attain the critical mass it needs to make all the difference in the way we live in the world. This linking of minds even has a name. It's called the "global brain."

Think of it: a complex, intelligent being, the size of the globe.

There's something undeniably captivating about that image.

Living Technology *will explore how information technology changes the way people work and live.* **Hazel Kahan** *is a psychologist living in New York City, where she runs her own market research firm.*

Watch What You Say!



and then change it around, if you like. In fact, the SoundWorks™ software package from Metaresearch, Inc. gives you complete control over any sounds you use on your NeXT™ computer.

SoundWorks is just the most recent product from Metaresearch. We specialize in hardware and software tools for multimedia on the NeXT platform.

There's Digital Ears™, our precision audio digitizer that's powerful enough to be used for laboratory data acquisition, as well. And Digital Eye™, our video digitizer that comes bundled with the software applications Snapshot™ and MovieWorks™. Plus future products that will help you further enhance and expand your NeXT computers.

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Photography/Mary Merrick

NeXT Ink/Dan Lavin

The people at NeXT have one clear goal: They want to change the world. The lever they plan to use is computing. They view computers as tools that, if engineered correctly, can liberate human beings to think and create more freely.

Reaching beyond the idea of personal computers, which are built for individuals, they extend this vision to the group. Over the past five years, the NeXT team has come up with an idea based on their own experience working together so tightly—that people working together can do so far more effectively with the aid of computers. Computers can encourage groups of people to think, create, and exchange their thoughts with a flexibility impossible with other modes of working.

NeXT as an organization has been fundamentally changed by this vision, which they call interpersonal computing. The vision is still being formulated, but the promise is clear: By providing a complete set of technologies that work together, the NeXT family of computers will fundamentally change the way a group works. These technologies currently include such things as e-mail, fax, and a shared calendar; they promise to evolve into an even richer set of tools over time.

The problem NeXT faces is that in order to change the world, a lot of people have to buy into the vision, which means—from the standpoint of NeXT—buying a NeXT computer. Moreover, this vision needs to be refined and put into practice by many workgroups. Therefore, lots of people need to buy lots of NeXT computers.

This is the area, then, where NeXT needs to do some leg work. They must find ways to sell their computers.

For a long time the stumbling block was obvious: It was the machine itself. In the process of pushing the parameters of technology, NeXT ended up with a product that, ironically enough, had performance problems and was priced out of the reach of most people. The '030 cube was sufficient to test the workgroup concept but not to implement it. This time around NeXT has solved the problem in spades. The new machines are a *tour de force* addressing the former problems in both performance and price. If sold by the millions, the NeXT could be a machine for the mainstream.

The big dilemmas now hinge on UNIX and distribution.

UNIX is the right operating system for NeXT. It is unsurpassed in flexibility and power. Interpersonal computing requires support for many things going on at once, and UNIX is the only real choice for true multitasking. But UNIX is complex. NeXTstep, NeXT's graphical interface layer on top of UNIX, is a stupendous achievement (see "NeXTstep 2.0" in this issue), but there are holes in this layer that make it less than plug-and-play. Currently the system software is like a car with its hood up. NeXT has left some wires exposed while they work out the kinks. Now it's time to close the hood, make the interface seamless, and move onto the mainstream highway.

As it stands now, too many tasks require technical expertise. One important example is setting up a network, a key to interpersonal computing. NetInfo is the proprietary administration tool provided by NeXT to do this. It's powerful, but it has a complex user interface that may intimidate the average user. Ideally, a department should be able to order five machines by mail order, set them up, and run a standard network with minimal help. That would bring the promise of interpersonal computing to the average person. Then the first gear would be in place to start changing the world.

Another important goal of this vision is to make communications with the outside world seamless and built-in. You would be able to plug in your NeXT machine, plug your phone directly into the back of it, run a simple piece of software, and have the world as your oyster. There should also be an easy connection between telecom and e-mail because, after all, you have to be hooked up to the world before you can start changing it.

But even a perfect machine needs to be in people's hands before it can make a difference. You can't change the world a few engineers and mathematicians at a time. Distribution is currently in a total shambles, and Steve Jobs is not revealing what he's going to do next. Even interested potential buyers may not be able to become NeXT owners simply because they can't get the machine.

NeXT must now make some serious choices. As a small band of about 500 people they have the power to transform the face of technology but not create new retail channels or modes of consumer marketing. In order to sell to the broad market, a company must succeed at retail like Apple. In the traditional workstation market, it must sell direct, like Sun. NeXT must choose one road or the other because the pricing strategies, if nothing else, underlying the two methods are completely different.

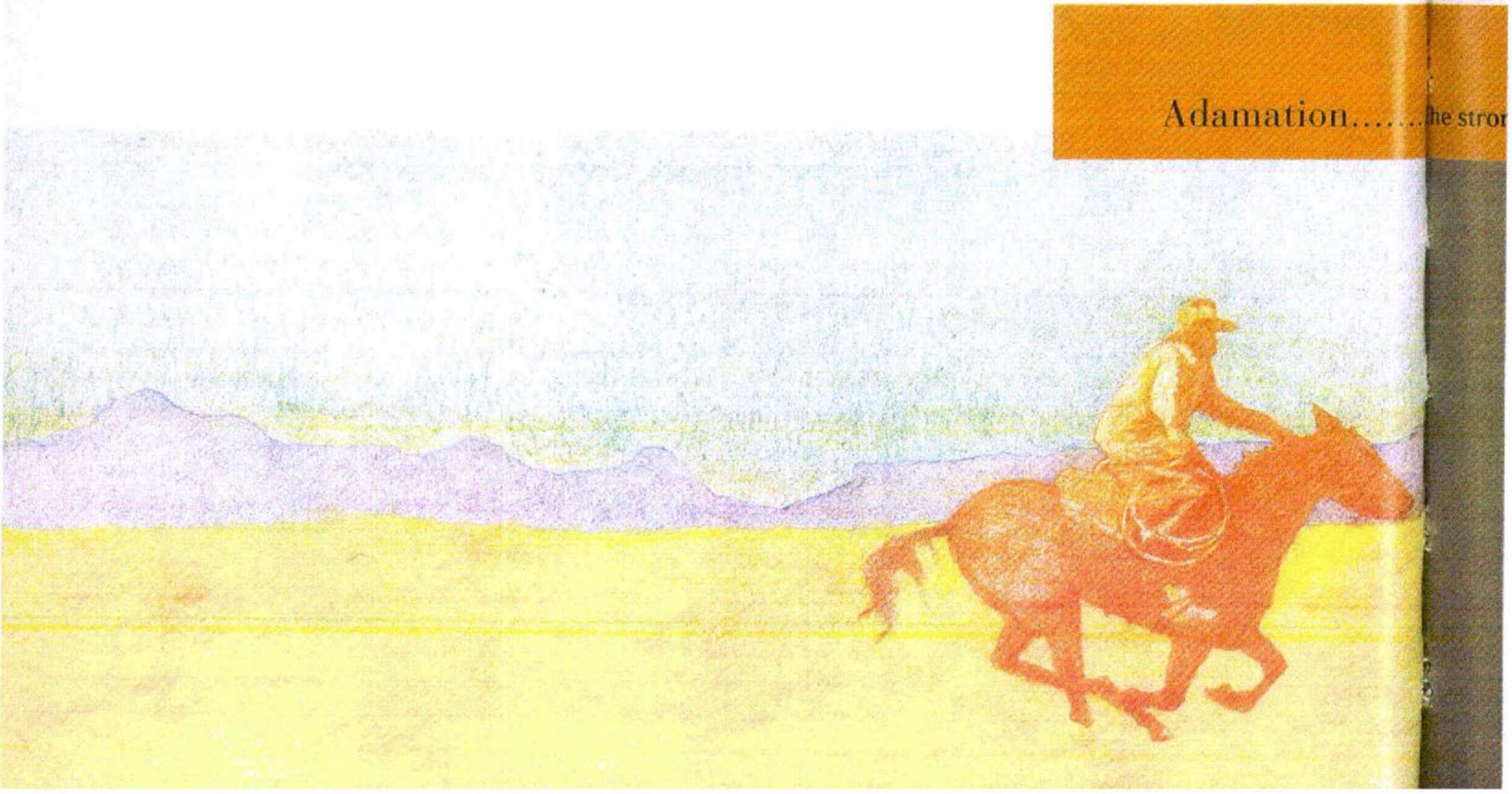
Though the NeXT is a great workstation for a fantastically low price, it would be a mistake to focus sales efforts on the traditional workstation market. At its heart this machine is a logical extension of the personal computer—an interpersonal computer. Though NeXT has developed the best sales and sales support team in the world, they are not equipped to swell to the thousands of salespeople needed to sell directly to large customers, as Sun and IBM do (and that kind of effort would miss the small customer and dilute the vision). Right now, the sales force is spending all its energies selling directly to the Fortune 500. It would also be more productive if the sales force could be used to help leverage more traditional channels of distribution.

NeXT has got to go retail, and go retail with a vengeance. They need to make the machine available through a wide range of outlets. They need to sell through most computer chains. I also envision a powerful network of independent retailers specializing in these machines. Brand-new entrepreneurs, working hard, could really spread the idea of an interpersonal computer. Look at what independents have done for cellular phones, another relatively complex technology. NeXT would need to help the dealers get going both financially and technically, but that would cost only a fraction of the price of a direct sales force.

For wider distribution, I strongly advocate mail order sales. If NeXT would solve some of its interface problems, especially in networking, you wouldn't need all the hand-holding now going on nationwide. People like to buy through mail order. Let them. Mail order would legitimize NeXT as a mainstream player and provide low-cost access for isolated pockets of users not in the Fortune 500 or near a major computer retailer.

At the same time, the NeXT family needs to be rounded out. NeXTstation screams for a laptop. I hope that NeXT is hard at work on this. Pop the hood on a NeXTstation and you'll see a single board, light power supply, and small drives. Let's put together an eight-pound NeXT with a flat screen, just as sharp as the current one—and include cellular communications, of course.

The software goals I've mentioned have never been met by anyone, including Apple, and certainly by no one in the UNIX environment. Generic distribution of powerful computers would also be a new trick. But you have to pull some aces if you are



going to change the world. . . . Can NeXT possibly do it? Well, their way of approaching the future is interesting. Rather than pre-ordaining a path, they gather up the best and the brightest, fuse together the best of their ideas, sprinkle in state-of-the-art technology, and watch what comes out. After a few stumbles, this freewheeling method seems to have paid off—they've given us 90 percent of their interpersonal computer. After NeXTstep, NeXTstation, and NeXTdimension, I think the company that is changing the world is up to those challenges.

Note: I'd like to credit Stewart Alsop for the insights into NeXT's place in the computer market, which he contributed during a conversation with me last summer.

Shorts

- NeXT Connection (NC) has entered the marketplace. This is an arm of the large, well-established, well-regarded company in Peterborough, New Hampshire, that also owns Mac Connection and PC Connection. They are an important part of the community because they provide small software developers with a sales outlet, and the NeXT allows small, focused applications to be created by people in their spare time—folks who have no time for sales or marketing.

  The combination of NC and 2.88MB floppies helps to solve these problems. I had a chance to speak with the folks at NC. They have innovative ideas, a reputation for service, and an unbelievable middle-of-the-night deadline for next-day delivery.

- Both Apple and Sun have released new machines. The offerings look impressive on paper, but I've had little hands-on experience with either. The low-cost Macintoshes sport an optional microphone (shades of IPC). These features were sorely needed, but they don't really advance the cause of computing, especially if Apple can't ship them. Sun's machines, on the other hand, run 20+ MIPS. Though much more expensive than the new NeXTs, anyone willing to pay NeXT's old prices for the most powerful machine might be tempted by these Suns. A Sun is still inappropriate in the general business community, but the company bears monitoring in the traditional workstation market.

- Total sales of NeXT machines announced are 25,000 units, including 10,000 for higher education. This is an important number, demonstrating the success of the new platforms.

- Finally, NeXTstep 2.0 and NeXTstation shipped on time on November 26. Congratulations to Dave Besemer, Curtis Sasaki, and the rest of the team. ◘

***NeXT Ink** will focus a sharp eye on NeXT and its impact on the microcomputer market. **Dan Lavin** is technology editor of NeXTWORLD. He is always interested in talking about these and other NeXT issues. He can be reached at 415/978-3186, or e-mail nextwrld!dlavin@uunet.uu.net.*

.....he strong leader on the NeXT frontier

Taming a new frontier takes courage, skill, hard work, determination and vision. NeXT has presented the world with a new technological frontier, and Adamation is blazing a trail across it.

While holding a tight reign on office automation, Adamation is steering the complex world of interpersonal computing with intelligent, productive software. It's total solution approach begins with"Who's Calling ?", the most advanced client database management system available today. And its available exclusively on NeXT. Adamation also offers Live Wire, a true interpersonal computing product for sharing information and collaborating effectively over a network.

Beyond these shrink-wrapped solutions, you can put the Adamation posse to work to solve your unique information management needs. They can build on existing products or create new ones from scratch, which ever works best for you.

One things for sure. Adamation is the one to lead you into the NeXT frontier.

Adamation 1435 Center Oakland, California 94607 415. 452.5252 **Circle 8 on reader service card**

Live Wire and Who's Calling are registered trademarks of Adamation

You're witnessing quite an important moment in the history of the Motorola 68040 microprocessor.

It's actually shipping. In volume.

And while advances in chip technology have become an almost annual event in the industry, you may rest assured that

MOTOROLA DELIVERS THE REVOLUTIONARY 68040.

there's never been anything like the 040 in a desktop computer before.

With its "single chip implementation," the 040 is as much an economic breakthrough as it is a technological one. Because many of the sophisticated functions that used to require expensive additional equipment are now built in.

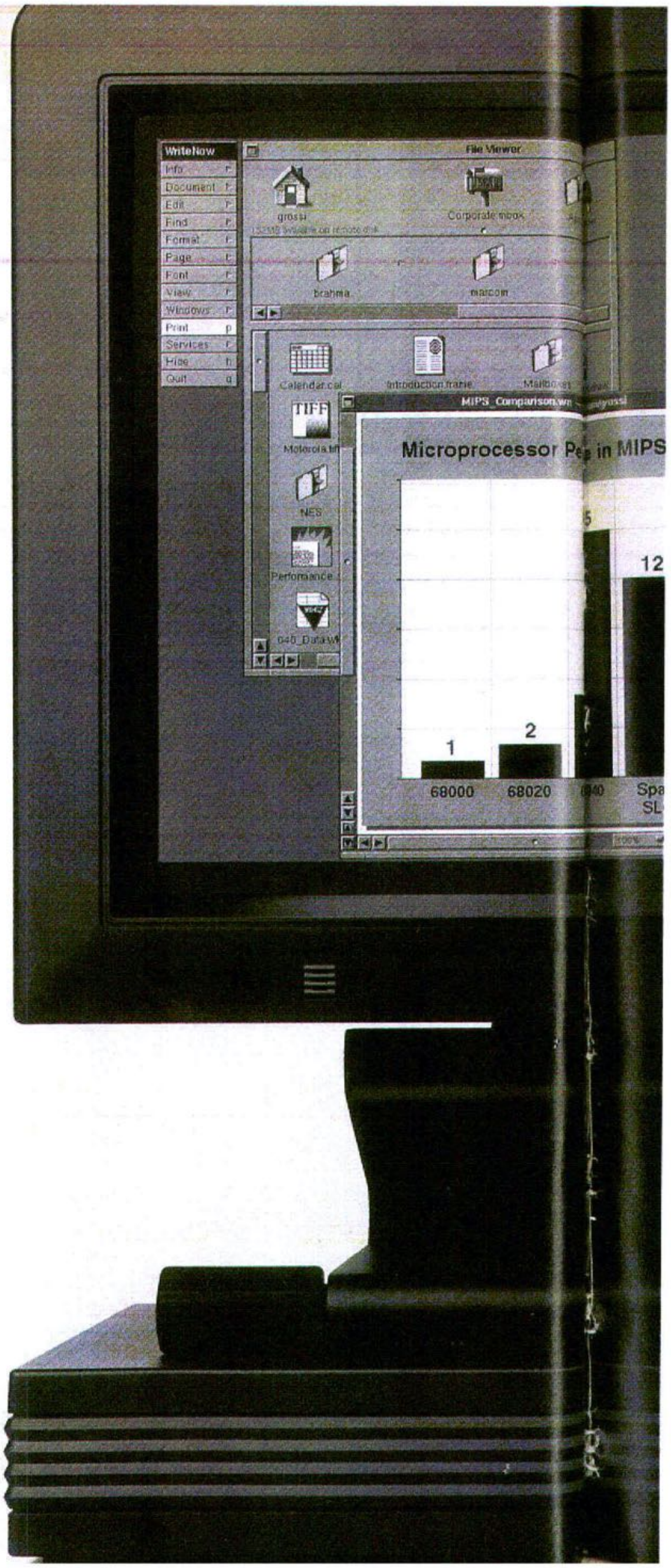
For example, the 040 chip incorporates the capabilities of a "floating-point" coprocessor. So it can not only handle high-level mathematical routines, but do so up to ten times faster than its powerful predecessor, the 030—the processor at the heart of many of today's fastest machines.

Cache memory has also been built in, to further speed the chip's operations.

While we're on the subject of speed, we're pleased to report that the 040 chip delivers a full 15 MIPS. In overall performance, that's 300% better than the 030. (And, for comparison, literally twice the performance of a Compaq Deskpro 486®.)

Of course, the 040 chip was designed to be perfectly compatible with all those computers that have been built around other chips in the 68000 family. So it will support the enormous base of 68000 software that currently runs on Macintosh® and UNIX® platforms.

The 040 is the result of an extraordinary effort by Motorola engineers. But if you think the chip is something, wait till you see what happens when you build a computer around it. **MOTOROLA INC.**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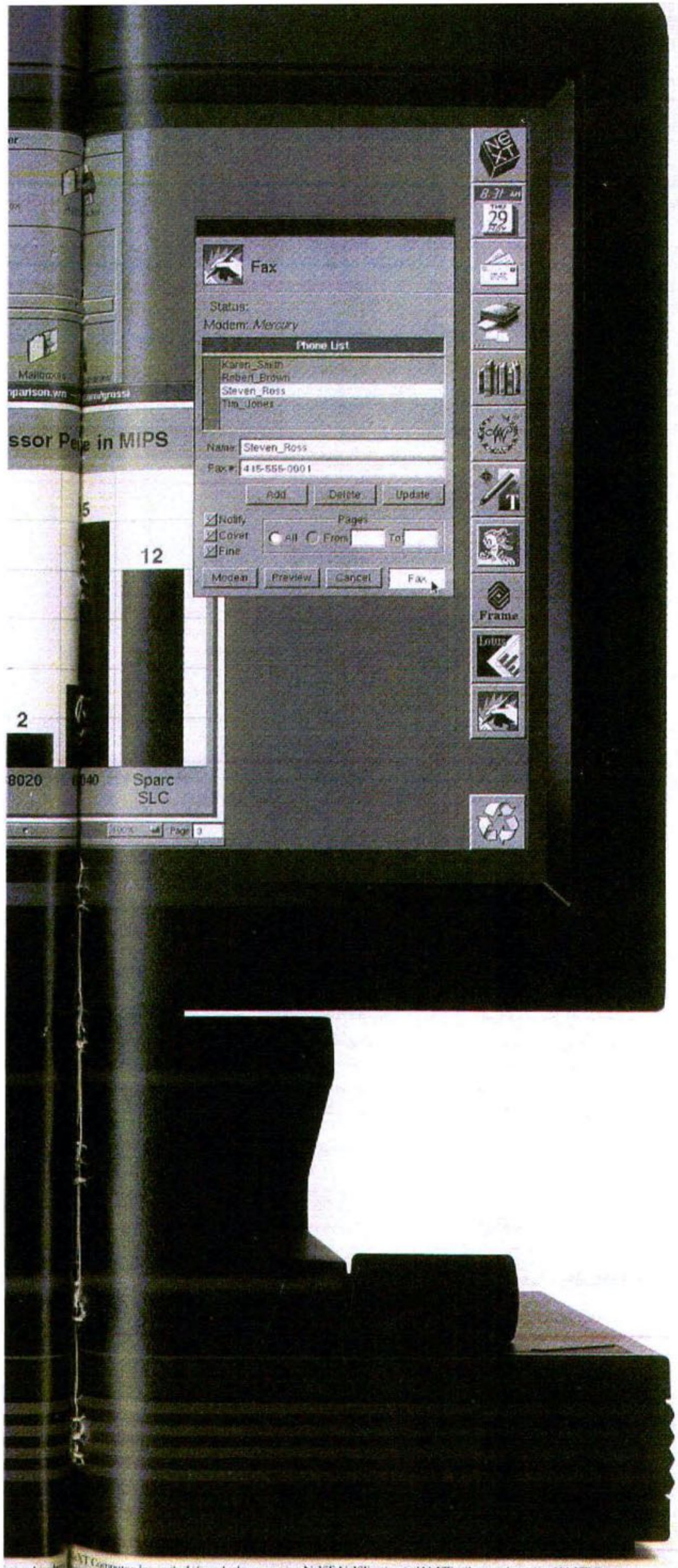
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By no coincidence, this is also a milestone in the history of NeXT™ computers. As promised, the NeXTstation™ computer is now officially shipping. In volume.

It's the first computer designed to take advantage of Motorola's most recent feat of engineering: the 68040 processor.

NeXT DELIVERS THE FIRST COMPUTER THAT HAS IT.

The NeXTstation offers the networking and multitasking power of UNIX, but without the complexity most workstations are known for. The graphical NeXTstep® environment makes it as easy to use as any desktop PC. Even Macintosh.

But the applications you can run on the NeXTstation are beyond anything you've seen on a desktop computer before.

Lotus® has recently unveiled Improv,™ a revolutionary spreadsheet that lets you view your data in infinitely different ways. WordPerfect® is offering the first "What-You-See-Is-What-You-Get" version of its best-selling word processing software. And Adobe® will soon be releasing the NeXT version of Illustrator,™ which fully exploits NeXT's pure PostScript® environment.

And with true multitasking, all of your applications can run at once. Including NeXTmail™—provided with every NeXT machine—which helps keep you in contact with everyone in your working world, using text, graphics and voice.

The NeXTstation computer comes complete with the 17" MegaPixel Display, 8 megabytes of memory, a 2.88MB floppy drive, a 105MB hard disk and both thin- and twisted-pair Ethernet. All for $4,995. Reason enough for *Byte Magazine* to say the NeXTstation "may now be the workstation price/performance leader."

If you'd like a brochure describing the NeXTstation computer in detail, just call 1-800-848-NeXT. We deliver.

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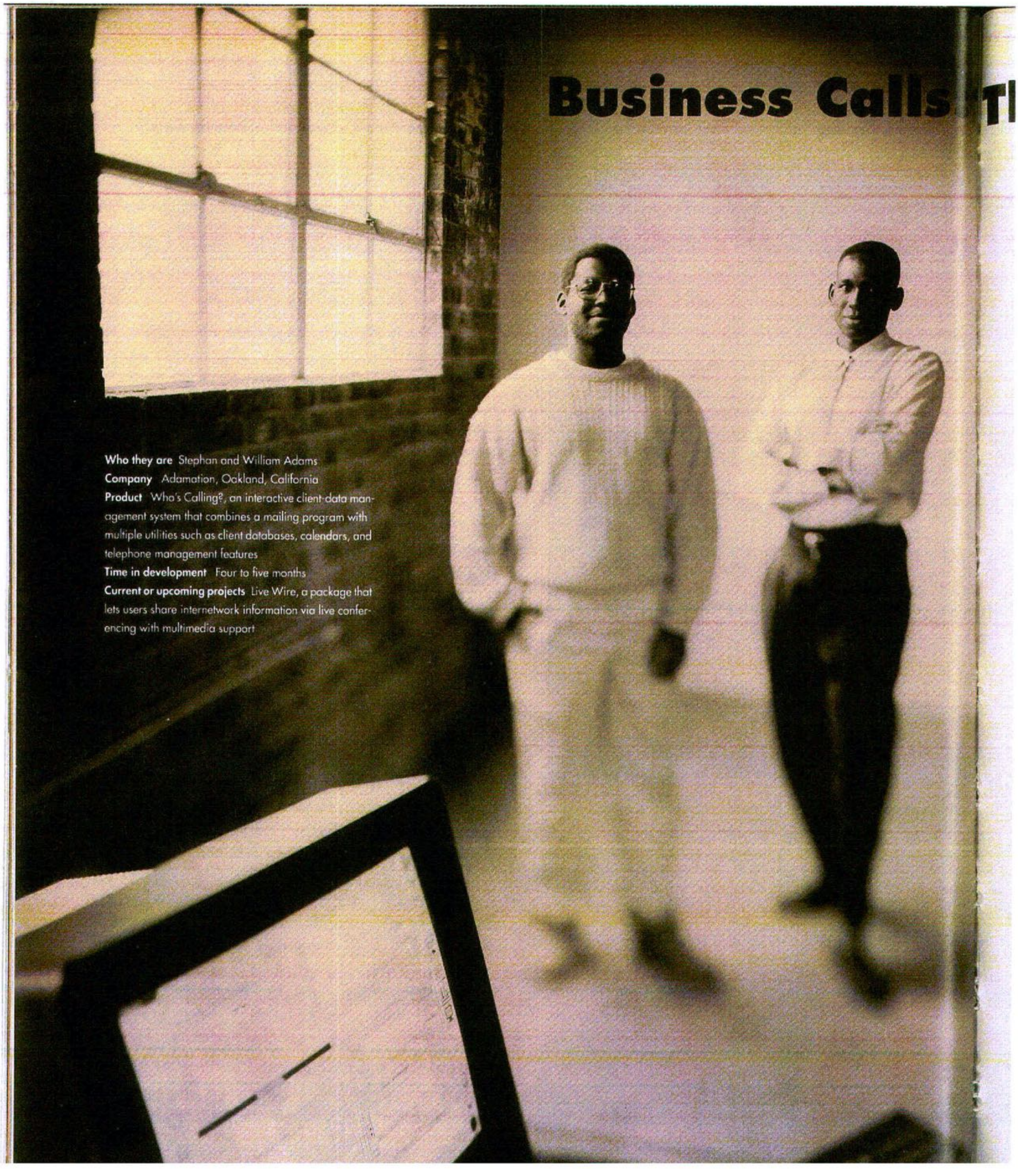
Business Calls T



Who they are Stephan and William Adams

Company Adamation, Oakland, California

Product Who's Calling?, an interactive client-data management system that combines a mailing program with multiple utilities such as client databases, calendars, and telephone management features

Time in development Four to five months

Current or upcoming projects Live Wire, a package that lets users share internetwork information via live conferencing with multimedia support

The Story of Adamation

The complementary talents of two brothers, a strong focus, and the right platform combine to make Adamation a success.

by **Roger Dubin**

Center Street in Oakland, California, is a world far removed from the geometric gleam of Silicon Valley. The people who live here are working class, mostly black, and mostly struggling. Yet, in a loft above a loading dock and a video services firm, a software company for the NeXT computer is thriving on Center Street. Adamation's two young founders, brothers Stephan and William Adams, grew up in neighborhoods like this one. Theirs could be a Horatio Alger story, and the nature and future of their company seem instrinsically linked with the character and success of the brothers themselves.

"We think it's right that corporations support minority businesses with affirmative action programs, but anytime anyone buys a product or service from Adamation, it's going to be because we competed head-to-head with industry leaders and won." **—Stephan Adams**

William and Stephan, now 26 and 28, learned the value of a competitive spirit from their parents. The Adams brothers were born and raised in Southern California, but forget visions of swaying palms, golden beaches, and easy living. Home was the barrio. Joseph Adams, a tough Navy veteran of World War II, and his wife, Julia, a social worker, encouraged their children to compete in sports to keep them straight. Joe died suddenly when William was almost eight and Stephan ten, but Julia remained determined in her involvement—going to every game, supporting every effort.

By the time he entered high school, William proved to be a mechanical whiz with gadgets, erector sets, electronic kits— "taking apart the stereo and not quite getting it back together," as he puts it. Meanwhile, Stephan realized an innate entrepreneurial flair. Teamed up, these characteristics proved to be a strong foundation for business ventures.

By this time the family had moved to the suburbs. When a neighbor installed a complex sprinkler system, Stephan watched to learn how it was done. Then he put in a clone system in his own yard. When he realized that the local landscapers were making a killing off of the systems, he decided to go into business for himself. Armed with photos of his system, lugging around sprinkler heads and manifolds for visual aids, he went door to door, underbidding contractors by 75 percent. He installed 16 sets. "The key was cheap labor," he jokes. "I got William to help with the mechanical side and recruited my friends to dig the ditches, and I paid them, well, not peanuts exactly, but pizza."

"You've heard 'What you see is what you get'? Our philosophy at Adamation is 'What you want is what you get.' What many companies don't understand is that when they make an investment in technology, what they are really doing is gambling on the development time for their custom applications, because so often by the time the applications are ready the technology is obsolete. That's the beauty of NeXT and, frankly, the beauty of the way Adamation develops applications with NeXTstep. A company might pay a little more for NeXT hardware, but development time is light years faster than it would be on any other platform, which more than offsets the hardware costs. And the results are going to be exactly what they want, for less money than they expect." **—Stephan Adams**

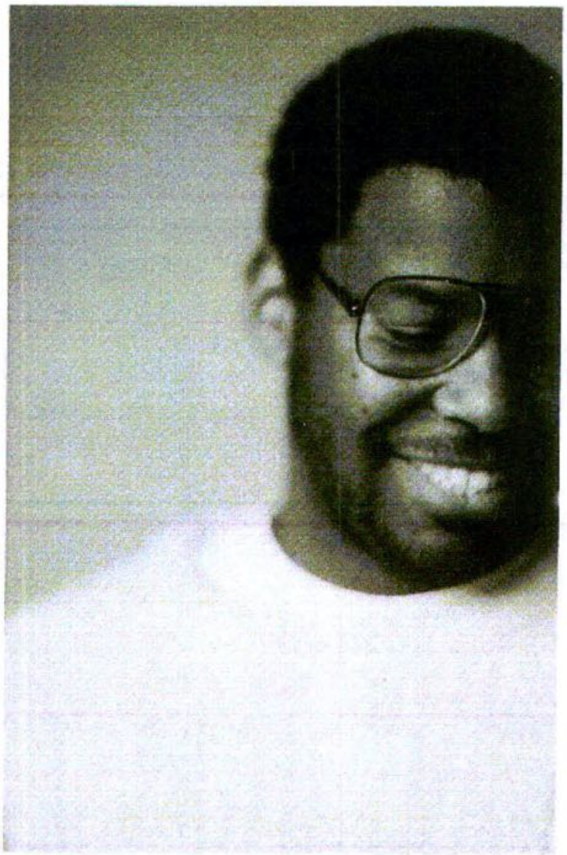
Taking pictures of the sprinkler system sparked Stephan's interest in photography. Coupled with a passion for track and field, this interest led him, with his brother's help with the wires, to produce multimedia slide shows of their team to present at awards banquets. At the same time, William was just discovering computers.

"I entered the computer world feet first," William says. To occupy him during recovery from a foot operation, William's podiatrist gave him a book on programming. Soon afterward, an uncle gave him a Commodore Pet, and William began programming in BASIC and machine code. When he was 15, William and a friend founded their high school's computer club, becoming the primary users and programmers of the school district's DEC PDP-11/10.

William was also discovering heroes: Nikola Tesla, Thomas Edison, Guglielmo Marconi. "Those guys were really on to something, you know?" he says. "Still, I looked at Tesla, who invented thousands of things, including AC electricity, and I wondered: Why is he so unknown; why did he die so poor? And the answer is that he was always at the mercy of money, having to sell his patents to Westinghouse and J. P. Morgan and others just so he could continue with his work. My thought was that ultimately I wanted to do those sorts of things too, and run my own little research facility, except to have it be self-funded. That's when I decided I needed to go into business."

"There are a lot of community programs that teach black kids about computers, except it's usually just word processing and spreadsheets. All that makes them into is some cog in the corporate wheel. One of the things we eventually want to do is teach black children how to program computers, so that they can learn to manipulate the computer's potential for good and be part of directing the future. We really want to leverage our business to help the community." **—William Adams**

After junior college, Stephan transferred to UC Berkeley, the same campus where William was enjoying being away from his elder brother. "It was role reversal time for me," Stephan recalls. "At home, I was usually the leader, but now I was entering William's world, and he took the lead." But as usual, the brothers



William Adams

pooled their resources. Stephan earned money as a waiter in upscale restaurants; William became the assistant manager of the campus computer store. The following year, William quit school to become manager of the store.

That year, 1984, was exciting for the Adamses. The store was doing about $4 million a year, the Macintosh had just been introduced, and Berkeley was chosen as a prime test site for the Mac educational program. In April, the brothers decided to form Adamation. They also began publishing a magazine called *Computer Dialogue*, to which William contributed some free-ranging articles featuring ideas, such as voice annotation and network-distributed databases, that later found a home in Adamation's products for NeXT.

On the computer side of the business, William and a friend (who now works at Sun Microsystems) developed a word processor for a blind student and a joystick for the Mac before one was available to the public. Meanwhile, Stephan landed their first big contract in 1986 from an Oakland company named Catalyst Productions, which needed a custom mailing program. Out of that project, William developed PC windowing tools long before they were available from Microsoft. They never marketed any of these products, however. "I mean, who would want a joystick for a Mac or windows for a PC?" William quips.

Not until the 512KB Fat Mac came out did Adamation offer its first real product: memory upgrades for the 128KB machine. That's when William took the plunge and began to devote all of his time to Adamation. Stephan supported himself, William, and their fledgling company while simultaneously beginning a Ph.D. program in clinical psychology at the Wright Institute, which he will complete in June.

Despite some lean years that followed (they dubbed 1986 the Year of Peanut Butter and 1987 the Year of Popcorn), the brothers' attitude toward money has remained the same: "Whatever we have belongs to both of us and to our business." But peanut butter and popcorn get pretty old pretty quick. William knew he had to earn some money.

***"When we heard that Steve Jobs had left Apple, we wrote him a letter. We said: 'Whatever you do next, we want to be part of it.' We knew that even if it involved processing horse manure, if Steve Jobs was doing it, it would be new and visionary and important to the world, and we didn't want to miss out."* —William Adams**

Responding to an ad posted on the Berkeley campus from a company called Ingres, William got a contract to test its UNIX database. The project lasted two years, but more important than the financial relief was the birth of a professional association that would prove crucial to Adamation's future. The relationship with Catalyst Productions also produced key results. Impressed with the custom programming Adamation had created, Catalyst offered the brothers some unused space in their new offices on Center Street free of charge until they could afford to pay rent. Catalyst's patronage took Adamation out of William's apartment and put it on the map. Now the brothers were ready for NeXT. And NeXT was just about ready for them.

Before they even entered the ground floor of development with NeXT, William and Stephan realized that all the major packages, like spreadsheets and word processors, would be produced by major vendors adapting programs from other platforms. They also figured, judging from their past interests, that the type of product they would want to create for Adamation would require a database. Sybase was slated to be bundled with NeXT machines, but Sybase wasn't available yet. Instead, they saw an opportunity with Ingres and sweet-talked their way into the NeXT development community.

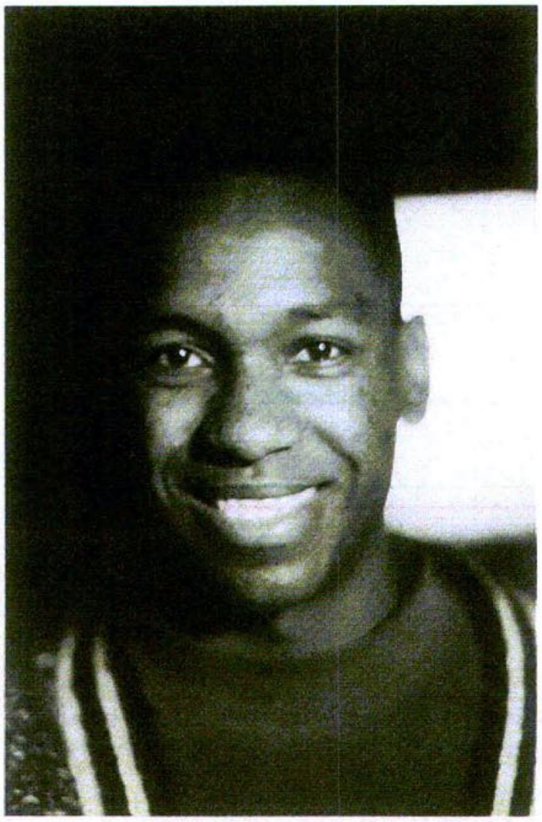
***"We had Ingres saying they'd contract us to port their database to NeXT if NeXT would give us a development machine, and NeXT was saying they would give us a development machine if Ingres would contract us to port their database. We convinced each one that we had the other, and before anyone could think about it too long, we wrote a check to NeXT for $14,000. The only problem was that we only had $6000 to our names. So while William went off to developer's camp, I flew to New Mexico and got a company who knew our work and had expressed an interest in using our services to front us $8000 against a future contract. Then I rushed the funds into the bank just before the check bounced. Aside from that, every dime in Adamation is our own."* —Stephan Adams**

"The important thing is that we ported Ingres to NeXT, normally a very expensive process, for no fee to Ingres," Stephan explains. "Instead, we negotiated a very favorable licensing agreement for ourselves. Because of that, we were able to build our own product inexpensively on what we feel is a superior foundation. Plus, we had a substantial lead over anyone else who wanted to do a database product, because Sybase still wasn't ready."

All they needed now was a great idea, something nobody else would think of for the NeXT platform—a horizontal product that would cut across a multitude of industries and all the departments within those industries. So they surveyed Macintosh and PC magazines. What they got were a lot of little ideas that added up to a big one.

"We started noticing all the little utility programs that were available—calendars and telephone management, client databases, and the like," Stephan explains. "Then we thought about the mailing programs we had created and realized that with that sort of program at the center and the best of these other utilities linked to it, we could create a product that would utilize the unique features of the NeXT machine yet be aimed right at the real beauty of NeXT, which is networking. That's how Who's Calling? came to be."

Who's Calling?, Adamation's flagship product, is an interactive client-data management system. The evolution of the package brought together everything the brothers had learned from their diverse experiences—the hard knocks they'd earned from their own business endeavors, the insight they'd gained from Catalyst Productions into how corporations live or die on client data, and their natural savvy about finding the right market niche. This company's philosophy of development—using the knowledge gained from doing custom applications to develop shrink-wrapped products that have already undergone real-world testing—has paid off in a unique profile with which Adamation can approach the corporate community. Who's Calling?, now in release 2.0, has been the



Stephan Adams

deciding factor in selling NeXT hardware to some big clients, such as the William Morris Agency, the oldest and most prestigious talent agency in the world. Adamation's latest product, Live Wire, an interpersonal computing program for sharing internetwork information via live conferencing with multimedia support, seeks to follow the same philosophy.

People at NeXT also recognize the success of Adamation's tack and the developers' commitment to the NeXT environment and philosophy. "Here are a couple of guys who were there at the beginning, who bet their futures, their business, everything they had on this machine and this philosophy, and won," says Max Henry, executive director of the developer partnerships program at NeXT. "I think they are a very important part of our future, because they are on the leading edge of this thing we call interpersonal computing."

Henry points to an instance when Steve Jobs visited the William Morris Agency early on in the Adamation project. "People were coming up to him and saying, 'I have never used a computer before a month ago, and now I don't know how I could survive without one. It's changed my life.' They were speaking about Adamation software running on NeXT hardware," Henry explains. "I think that speaks for itself."

> ***"In the future I know I'm going to be involved with Mindlink, the direct hookup between the human mind and computers. What I'm doing now is a lot of thinking about the practical social implications—how this can affect mankind, how it can be used to help young people better organize their thought forms, how to prepare and change society so as to avoid culture shock when it becomes reality. Look at the beginning of the PC revolution. The advertising tried to scare people into using computers: 'If you don't learn this, in five years you'll be obsolete.' A lot of the educational software was written by programmers who didn't know how to teach, or teachers who didn't know how to program. Sometimes I think it's still that way. With Mindlink, we can't afford to be unprepared because the implications are just too overwhelming. I hope when the time comes, I can help lead it down the right road."***
> ***—William Adams***

Regardless of what lies ahead, the Adams brothers plan to maintain the spirit of competitiveness they learned from their parents. Although he recognizes that at some point Adamation may have to consider some form of capitalization to continue growing, Stephan regards that decision as a test of their character. "We look at it this way: If we have to compromise our ideals and the opportunities we've worked so hard for just to raise money, then we don't deserve to keep this company," he explains. "What's the worst thing that could happen? That we'd have to go out again and get jobs to support it? That's not so bad. We've done that. Sure beats selling out."

Roger Dubin *is a free-lance writer, advertising and marketing consultant, and NeXT user living on the island of Maui, Hawaii.*

Mastering a Different World

"My brother is a mastermind," Stephan Adams says reverently. But talking to William Adams makes you believe that almost anyone can program in NeXTstep.

While completing the port of the Ingres database to the NeXT, William was also getting to know the NeXT way of programming. The front end of an application is set up completely through the Interface Builder. "You just lay out your screens, drag windows off the palette, position them where you want, and then drag your buttons and sliders into place; when it looks right, well, that's it as far as your interface."

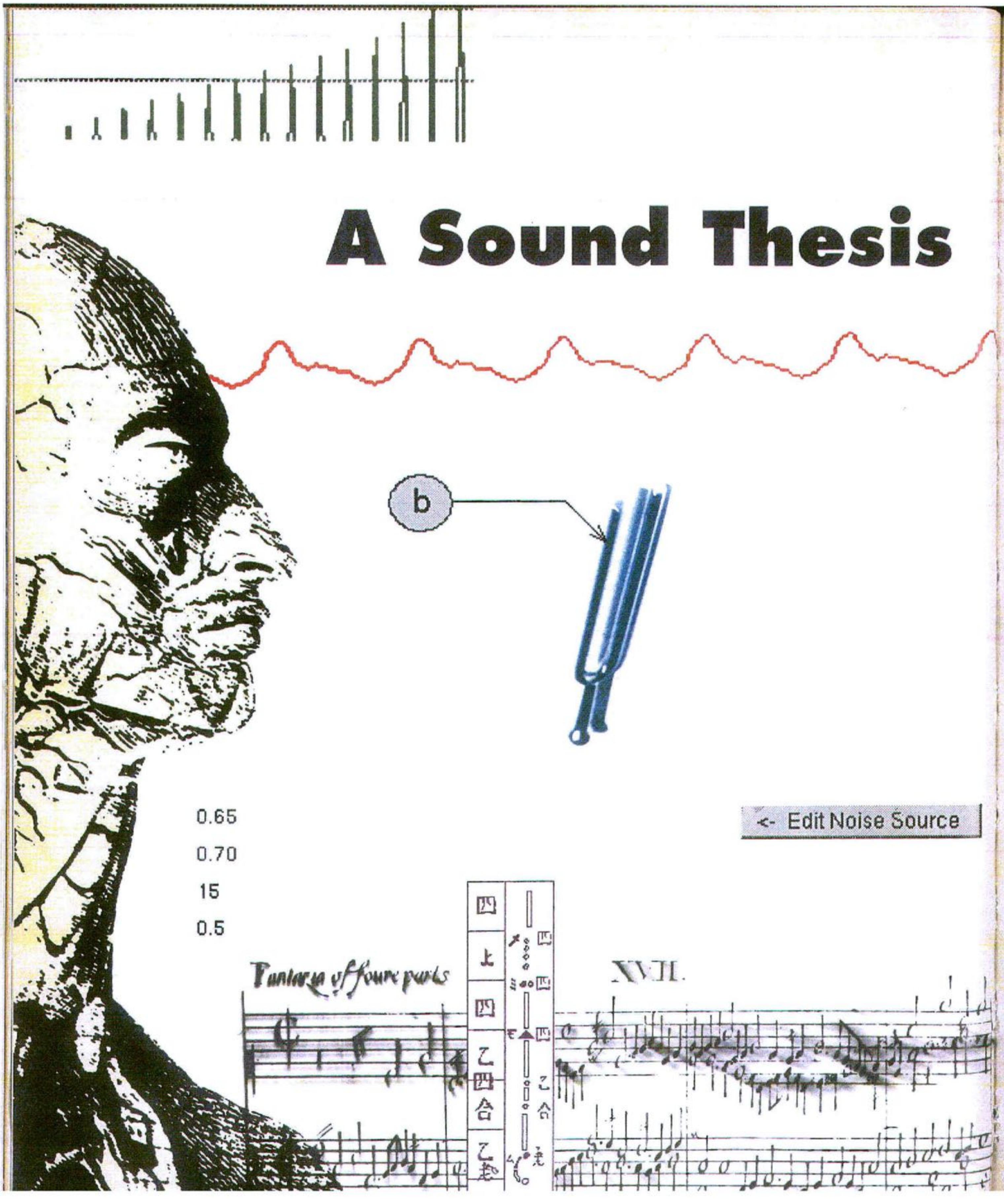
That's a total departure from the norm, he says, because there are no tedious codes to write that specify exactly where to place windows or buttons. With a Mac or any other platform, you must write those codes, "which consumes 80 percent of development time and represents about 80 percent of the code as well," he gauges. "With NeXT's Interface Builder, that's reduced to maybe 10 percent."

Once he had built the front end, he still needed to write the part that manipulates the database to make it talk. "That's the essence of the code you are writing, of course, and even NeXT hasn't gotten around that part of the process yet," he says. The problem for Adamation was that Ingres wasn't designed to be used with an object-oriented environment. William had to create his own object-oriented interface between Ingres and Who's Calling? This represented about 500 lines of code that were going to have to be repeated over and over.

"What NeXT has done is make it possible for us to eliminate that 500 lines of code by writing a general interface object, which we call Data Manager, between Ingres and our application. Now, when I need to send a command to Ingres, I just send it to Data Manager and let it worry about how Ingres wants to deal with it, how the results come back, and how those results get transferred to the program."

By working in the NeXT environment, William has been able to develop a set of these special tools and objects that combine common sets of codes so that each time a function is desired, the code doesn't have to be rewritten. Programming time, mistakes, and bugs are cut to a fraction, he adds. Who's Calling? took about four to five months to develop in the first place. "That's only half the time it would take on any other platform, even if you could find another platform with all the NeXT features, which you can't," he says. "If I started right now, with all the tools and objects we've created, it would take maybe two months. Our development time keeps getting shorter and shorter as we go along because we keep building off these objects."

A Sound Thesis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Researchers at Stanford study synthetic sounds to create the NeXT generation of computer music.

by **Laura Fredrickson and Thierry Castro**

Stanford University's Center for Computer Research in Music and Acoustics (CCRMA) resides in a Spanish Renaissance–style mansion atop "the Knoll" on campus. Students and faculty come to CCRMA (pronounced "karma") from the fields of music, electrical engineering, computer science, and psychology. Their projects span the far reaches of the arts and sciences.

"We can extend our fantasies," says John Chowning, professor of music and director of the center. "It starts with passion for music and composition and a curiosity about the medium in which we work. Computers let us break the boundaries of the physical world to create sounds that don't naturally exist."

Studies at CCRMA range from composition and performance to digital synthesis and psychoacoustics (the study of how the auditory system perceives sound) and reflect the center's interdisciplinary nature. The physical atmosphere, too, is a mixture. State-of-the-art sound equipment stands in sharp juxtaposition to the old-world surroundings. Modern studios packed with synthesizers, mixing boards, and NeXT computers are just steps down the hall from a grand ballroom where classes convene beneath sky-high ceilings edged with baroque fixtures.

Behind the scenes. At the heart of CCRMA's work is the Common Music software, a vast set of programs and system tools for editing, viewing, and synthesizing sound. Common Music is a collection of CCRMA's nearly two decades of research. Working without it, Chowning says, "would be like putting a violin in a student's hands and telling him to learn to play, without giving him any idea about how to hold the bow or how to pull it across the strings—without any knowledge of previously discovered techniques."

Until recently, Common Music resided on a Foonly F4 mainframe, a DEC PDP-11/10 emulator. Implementing the software required the Samson Box, a one-of-a-kind synthesizer that looks like a giant green refrigerator. It was commissioned with grants from the National Science Foundation and the National Endowment for the Arts when CCRMA began. According to Chowning, the Samson Box with the Foonly "probably produced more music than any specialized synthesizer that has ever been built . . . and has been the center of all of our instruction and research over the years."

Just about a year after moving to its current site, the CCRMA staff decided to retire this behemoth setup. The Foonly was a time-shared system, but the music playback from the Samson Box was a central service that had to be scheduled. Instead, what CCRMA needed was an integrated multiuser system that would support both functions simultaneously. So in 1989, they began moving operations onto NeXT computers.

Two major factors convinced the CCRMA staff to choose the NeXT platform, according to Chowning. Most important was NeXT's commitment to music and sound. "NeXT was providing not only an integrated system with sound capability—which you can have now with other systems, but not from a manufacturer—but also the supporting software. That was a commitment that no other computer vendor has ever made," he explains.

Second, NeXT had recruited Julius Smith, an associate professor at CCRMA and an expert in digital signal processing (DSP), to design the computer's DSP software for music. This move showed the people at CCRMA that NeXT was hiring top talent. It further convinced them that NeXT was seriously committed to music and, in Chowning's words, "wouldn't make any dumb mistakes."

Chowning also cites a key advantage for university settings. "If you have a system that costs about as much as a piano," as the NeXT does, he says, "there's a hope that you can go to your department chair and say, 'Look, this is what we need, and this is what it costs.' It's within imaginable budgets. But what one gets is enormous. That's one of the reasons we adopted NeXT."

Off and running. Although CCRMA has had the NeXT machines for only a short time, several projects on the computer are already underway. One graduate student is creating a real-time MIDI performance system; another is studying how a machine perceives music so he can develop a cognitive model of listening. Others are physically modeling instruments; that is, they are constructing computer models of instruments so they can manipulate the instruments' shapes on screen and study the effect that these changes have on the sounds produced.

On the faculty side, visiting professor emeritus John Pierce is conducting experiments with tone pitch perception to better understand how the auditory system works. And in addition to conducting classes on the NeXT, Chris Chafe, CCRMA's technical director and an associate professor of music, is modeling stringed instruments to determine the effects of friction on the strings.

A new voice. When CCRMA's first NeXT machines rolled onto the Stanford campus in January 1989, Perry Cook was able to grab a Cube for his project, one of the most notable pieces of research underway at CCRMA. Cook, a doctoral candidate who holds degrees in both voice and engi-

neering, is developing a computer simulation of a human singing voice.

Cook's program, called Singing Physical Articulatory Synthesis Model (SPASM), is an interactive program that models the physics of the human vocal tract. Cook regards the voice as an instrument and, as such, a natural progression in the work that CCRMA has been doing for the past decade in computer modeling. "Voice extends the family of models," he says.

A synthesis model that is based on the physics of an instrument, Cook explains, lets a musician or researcher physically describe what something sounds like. This, in turn, can help him or her understand what may need to be done to fix a problem in the simulation. By looking at how the inside of a singer's head works, he says, you can intuit how things should sound. "You get a lot of natural behavior. It behaves as a physical simulation would," he explains. "You know how to play it, in a way.

"On top of this natural behavior is the flexibility to do really weird things, too," Cook notes. "Like build a singer with three mouths. We can do that with a computer. It's still a very natural sound, because it's based on something physical, but it's now entered the realm of the non-human."

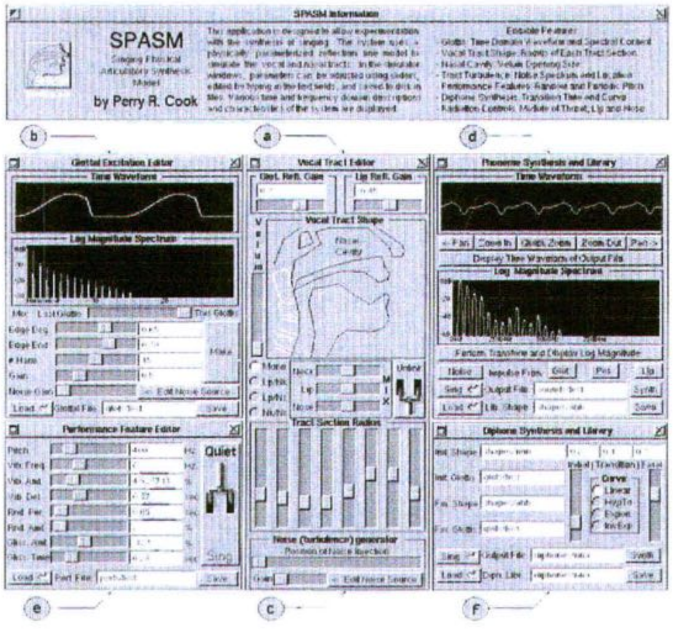
So what's the point of enabling a computer to sound like Ella Fitzgerald? A computer simulation of a singing voice, just as a simulation of an instrument, could be added to synthesizers, giving composers another component for their computer music. Further research should yield voice tracking and recognition, or being able to imitate—"mina bird fashion," Cooks says—the way a speaker sings or talks. A capability like this could be an interactive model for language instruction, both for students learning foreign tongues and for the deaf learning to speak. The machine would give feedback on the speaker's performance. An interactive system would also be a boon for linguistics or speech therapy students. Or it could be used to generate controlled stimuli for testing in psychoacoustic research.

On screen, SPASM displays the cross-section of a human head, showing the mouth, throat, and nasal cavity. Cook can manipulate the parameters—change the shape of the mouth, alter the position of the membrane separating the nasal cavity, or imitate other physical changes—by using sliders and switches in various editor windows. By clicking on the appropriate switches, he can choose to hear the resulting vocal changes either in real time or on request.

But creating a singing voice is much more complex than synthesizing the sound of a musical instrument or a speaking voice. Voice is a unique instrument. It varies from person to person and is full of random fluctuations. SPASM can map a specific singer's voice, but, Cook cautions, a person's voice cannot be exactly duplicated because of its many individual traits. "Perlman's violin in my hands sounds pretty awful," he quips.

One of these personal characteristics is an individual noise component present in a voice. Cook says SPASM will help him to study sound frequency and control in order to understand more about this individual noise. He hopes to eventually model the noise as well.

Further complicating the task of synthesizing a singing voice is the need to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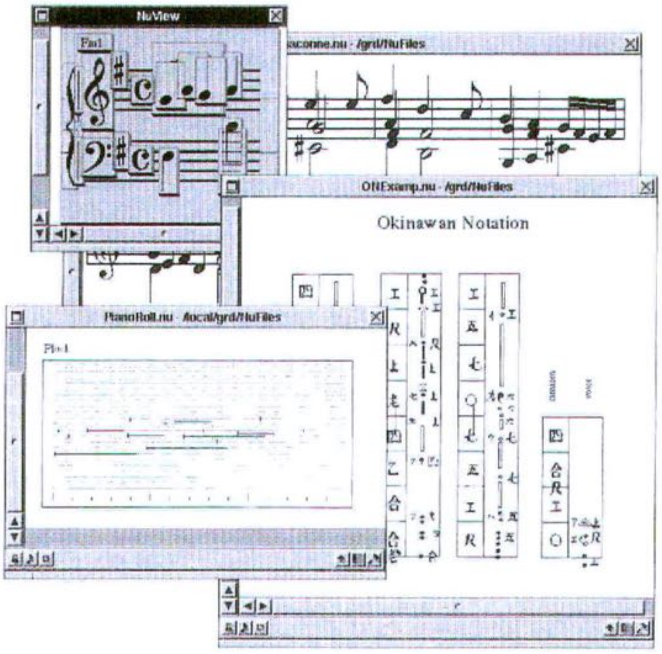
Myriad controls and switches operate the diagram of a human vocal tract in SPASM, a computer simulation of a singing voice. When the lips are repositioned or the nasal cavity closed, this "singer" produces sounds based on how a real singer would perform with the same physical changes.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Nutation, a music notation program, allows composers to write in a layered fashion, placing staffs on pages, then notes on top of staffs, and so on. Because Nutation is a visual programming language, composers can use non-Western notation or even create their own notation within the program.

incorporate pitch and vibrato. In speech synthesis, Cook notes, these factors are usually ignored. In SPASM, pitch and vibrato can be added using the controls. Cook hopes to add the option of setting the program to make pitch and vibrato automatic.

Cook began his work on a Mac II but moved to the NeXT to take advantage of the Sound Kit, DSP tools, and the Interface Builder development environment. "Probably the most important thing," Cooks says, "was having the built-in CD-quality sound in the DSP chip. When I first started out on this project on a Mac II, I had to walk to another building to hear my sound files." They had to be produced by other equipment in another location.

Having built-in sound has helped throughout the project, he adds, "because when I go somewhere to give a talk, if they have a NeXT machine, I can count on their NeXT machine having sound. That is not true for Macs or anything else. There are plenty of sound options for those machines, but you have to figure out which one they have, if any. All I have to do is make sure they have a NeXT, and that guarantees I can show what I'm doing."

3D music. Glendon Diener, a CCRMA grad student in the last throes of his dissertation, has also been busy on the NeXT. Diener has created a music notation program that he calls Nutation. The name is a pun of sorts, incorporating the ideas of notation, mutation, and newness. Basically, Nutation is an object-oriented visual programming language with which composers can write musical scores in a hierarchical, or layered, fashion.

By developing Nutation, Diener hopes to support his thesis that hierarchical data structures are superior to the linear, or flat, representations used in most computerized notation programs. With Nutation, the composer can layer the elements, or objects, of a score (the staff, clef, notes, and so on) on top of one another. "That is how most musicians are accustomed to thinking about notation," explains Diener, whose background is in music composition. "They are taught, for example, to draw staffs on pages, to draw notes and clefs on staffs, to draw dots on notes, and so on."

The flexibility of a hierarchical structure allows a composer to more easily shift or duplicate individual objects or groups of objects in a musical score. At the same time, it allows the NeXT computer to immediately play any part of the emerging composition.

Nutation is not limited to the display of conventional music notation. Because the system is a visual programming language, it gives musicians free reign to use other forms of notation (such as eighteenth-century Okinawan, a vertically oriented Japanese form) or to create their own.

Diener completed his project in about 15 months. The NeXT's simple user interface and Display PostScript were the key advantages for his research. "PostScript is available on many computers," he explains, "but on most computers it's available only for printing. The NeXT has Display PostScript. I don't really care about the printing. My program does print, but that's not what it's there for. On the NeXT, I can use PostScript directly on screen. And that's where I need it."

Diener will be keeping busy on the NeXT in the future, too. He recently took on the roles of NeXT system administrator and research associate at CCRMA.

The NeXT move. One of CCRMA's most formidable and important projects has been writing a compiler to get the Common Music from the Foonly/Samson Box configuration onto the new NeXTs. The task of rewriting all the old Algol-type code into Lisp fell to Bill Schottstaedt, another research associate at CRRMA with a background in composition theory. He began the project a year ago and has completed the port from the Samson Box. Schottstaedt estimates he should be finished by spring, but the material he has ported so far is being used for teaching students on NeXTs during the current winter quarter.

The NeXT provides several advantages over the older technology, according to Schottstaedt. For one thing, the interactive Lisp language makes manipulating the code easy. "It lets you try things out and change them," he says. Previously, even simple changes required rewriting a lot of code. "Now, for instance, to change the instrument on the synthesizer for one toot takes only about a minute."

This resulting increase in speed is another advantage he cites. On the Samson Box, composing a six-minute piece "would have taken four and a half weeks," Schottstaedt gauges. "On the NeXT . . . it would take an hour and a half." The DSP in the NeXT acts as an accelerator. Schottstaedt says the power of the DSP chips is essential to execute complex or demanding music techniques.

In order to match the computing and synthesizing capability of the Samson Box, CCRMA added a board developed by Ariel Corporation, with the collaboration of Julius Smith, that provides five more 56001 chips. "This brings us right up to the power of the Samson Box and more," Chowning says. "Now this is a system that excites composers."

Schottstaedt has grander visions for increasing the number of 56000s. "Once there are 50 or 100 chips on a board," he says, "composers will approach having an orchestra in real time. I don't see any technological barrier. Somebody just has to do it."

Instrument for the future. One idea that Chowning has clearly formed in his mind, if not in the studio yet, is something of a paperless concert hall. The NeXT project he envisions is an instrument and conductor all in one. Not only would the computer produce the sound for a performance, but it would also display musical scores on screen—complete with automatic page turning—for accompanying players. The NeXT's graphics, he says, could dispense with conventional paper sheets.

In addition to scrapping paper, the NeXT could also give a high-tech angle to music lessons. An interactive program, Chowning says, could give feedback from performances and help develop a trained musical ear.

Apparently no ideas are too fantastical. The NeXT has been a very welcome newcomer to CCRMA, and it's not about to be left to rest on its laurels. Whatever future roles the NeXT finds at CCRMA will surely be as inventive, creative, and diverse as the center itself.

Laura Fredrickson *is features editor at NeXTWORLD.*

Thierry Castro *is creative director of CX5, a design and production group in San Francisco.*

The New NeXT

San Francisco, September 18, 1990. It's a packed house at Davies Symphony Hall. An expectant crowd, filled with journalists, with the microcomputer industry's best and brightest, impatiently await the appearance of Steve Jobs. They've come to see what bold, new engines of the mind NeXT's been engineering at the cutting edge of computer technology. When Jobs walks quietly on stage, a round of applause relieves the tension. He wastes no time. He's here to dazzle.

Point by point, he addresses his critics. The Cube, he says, was an expression of potential, still unrealized. We've been in a long beta phase. You complained about expense, performance, the lack of color, the paucity of applications. In each case, we've got a few things here to show you. On top of that, our vision for the NeXT platform has grown more explicit. We're here to show you an interpersonal computer. We think you'll like it.

As the industry learned that day, it's pretty clear that NeXT has done its homework.

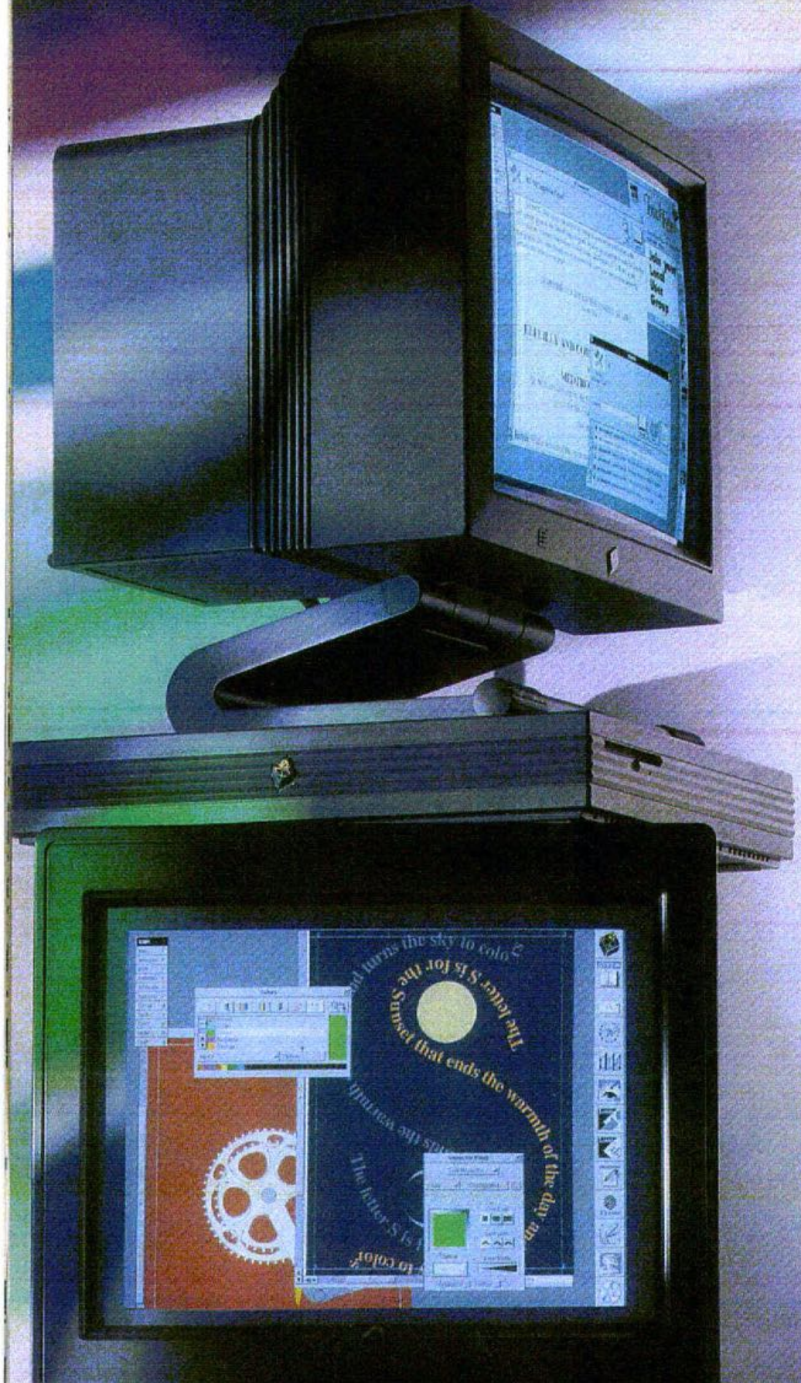
NeXTstation and NeXTstation Color. Here are two low-cost, high-performance engines poised to blow away the Mac IIfx and the Sun SPARCstation. The two "slabs," the black-and-white NeXTstation and the 16-bit NeXTstation Color, are sleek desktop workstations that promise to open a world of markets to NeXT in the realms of business, desktop publishing, engineering, and education. And like all new NeXT machines, they're built on the 68040 chip set, and run at three times the speed of the former '030. And—also like all new NeXTs—they've got a floppy drive.

NeXTdimension. Here's the high end for a NeXTcube system: a full 32-bit color board and monitor, targeted for those who want the best color system for desktop publishing. But that's not all. With onboard real-time video compression and 30-frame-per-second video processing, it's fast enough for film and video. Here at last is a multimedia platform that works, and you don't have to go to six vendors to get it. Move over Apple and IBM.

NeXTstep 2.0. Picture a graphical interface to UNIX that gives you clear transport through both individual and group filing systems across a network. Picture also an integrated suite of tools that includes e-mail, fax, interapplication communication, sound compression, and support for color across all applications.

Key software solutions. Finally, picture "best of breed" applications now running on the NeXT. Lots of them. Revolutionary spreadsheets, like Improv from Lotus. Electronic document management systems from companies like Boss Logic. Standards in the industry like WordPerfect for word processing.

With a performance is like this, we're a captive audience. We invite you now to sit back and judge for yourself. —**Michael Miley**



The Slab

The NeXTstation and NeXTstation Color provide NeXT power in a sleek and affordable new package.

by Nicholas Baran

Following the tradition, begun with the Cube, of naming NeXT computers after their distinctive shapes, insiders have dubbed NeXT's new NeXTstation computers the Slabs. A more apt nickname might be the Wedge, however, because these cut-rate, cutting-edge machines are designed to penetrate deep into the competitive personal workstation marketplace. The $4995 black-and-white NeXTstation and the $7995 NeXTstation Color are tough competitors of similar offerings from Apple and Sun. A black-and-white Sun SPARCstation SLC with a 100MB external drive costs about $11,000. A Macintosh IIfx with graphics and storage capabilities similar to the NeXTstation Color costs well over $10,000. NeXT's new prices pull their computers down into the high-end PC market, and out of the rarified atmosphere of $10,000-and-up workstations. And now that NeXT computers will be discounted at retail like the other vendors', these prices are fair comparisons.

At the September 18 introduction of the new computers, NeXT founder and president Steven Jobs acknowledged many of the problems that had barred the first NeXT computer from wide acceptance. Jobs admitted that the original Cube was too expensive, too slow, and lacked applications and color. The NeXT offerings Jobs then announced answered all those criticisms and more—including the strong criticism leveled at the original NeXT for its omission of a floppy disk drive. The question remains, however, whether the new machines' features will finally give NeXT a market share in computing's lucrative middle ground.

First impressions. The NeXTstations' sleek shape is the most obvious departure from the previous design: The NeXTstation and NeXTstation Color measure approximately 15 inches on each side and only 2½ inches tall. The magnesium case, with its scratch-resistant plastic cover, is strong enough to support the black-and-white MegaPixel Display, which weighs in at 33 pounds (10 pounds lighter than the original version), or the new MegaPixel Color Display, a hefty 70 pounds.

Though visually identical to the NeXTstation, the NeXTstation Color's system board uses a different memory configuration, which supports 16-bit color (4 bits each for red, green, and blue, and a 4-bit alpha channel for specifying transparency). You'll have to consider very carefully which computer to buy, because a monochrome NeXTstation can't be upgraded to a NeXTstation Color. This fact may give more than one buyer pause.

The new MegaPixel Display offers two improvements over the original version: an internal microphone, which replaces the microphone jack on the old model, and a much-needed anti-glare screen. The keyboard and mouse interfaces, microphone, and speaker are internalized in the MegaPixel Display, but are supplied through a separate device, called the Sound Box, for the MegaPixel Color Display. This allows for the connection of third-party color monitors, though NeXT's monitor is currently the best value on the market. Unlike the black-and-white MegaPixel Display, the color monitor requires a separate power cord.

A closer look. The real news, however, is inside the box. All of NeXT's latest machines (including an updated version of the Cube—see the sidebar "The NeXTcube" in "True Color" for details) feature Motorola's new 25MHz 68040 microprocessor, which is three times faster than the 68030 processor used in the original NeXT. According to NeXT, the 68040 processor offers a performance of roughly 15 million instructions per second and 2.8 million floating-point operations per second. In terms of raw power, that puts the NeXTstation in the same league as the more costly SPARCstation, and makes it faster than Intel 80486-based workstations running at the same clock speed.

In practice, the NeXTstation's performance far outshines the original NeXT computer, thanks to the 68040 processor, the fast hard disk, and the improved system software (for more on the new software, see "NeXTstep 2.0" in this special report). Operations that took several seconds on the old Cube are processed virtually instantaneously on the NeXTstation. Applications load immediately, and disk access is hardly noticeable. This performance boost was particularly apparent when I indexed a large text file using Digital Librarian, an application that uses keywords to search large text files. Indexing all the Supreme Court rulings from 1980 to 1989—an operation that would have taken minutes on the Cube—took only seconds on the NeXTstation. That's fast.

The streamlined NeXTstation owes its compactness to a few well-calculated design choices. NeXTstations lack the Cube's expansion slots and accept only half-height disk drives (the original Cube's full-height optical drive is available as an optional external SCSI device). Eliminating full-height devices decreases the demand on the power supply and cooling systems, which consequently have been made smaller. The NeXTstation power supply, in contrast to the Cube's 300-watt unit, draws only 120 watts and is based on a space-saving technology called parallel resonance switching. A set of fins underneath the power supply dissipates heat, and a small, virtually silent "whisper fan" sucks air across the system board from vents at the back of the case. Compared to the noisy whirring fan and hard disk of the Cube, the relative silence of the new NeXTstation is a welcome change.

Optical delusions. The lack of a floppy disk drive, and thus compatibility with the rest of the computer world, was one of the original NeXT computer's biggest limitations. Although optical disks are a great backup medium, they aren't very practical for exchanging data. Who wants to send a 2KB text file on a 256MB cartridge that costs over $50? In addition, the time it takes to access data on the optical drive makes it too slow to be used as a main storage device. The old NeXT machines needed a hard disk.

So NeXT saw the light. The new 2.88MB floppy drive is standard in the NeXTstations and in the NeXTcube. Files on the floppy disk are treated like any other file on the UNIX file system. The drive also reads 720KB and 1.44MB MS-DOS disks. Although the drive can't read Macintosh disks directly, file exchange is possible with Apple's new SuperDrive floppy, which reads and writes DOS disks. According to sources at NeXT, the company will support direct exchange with Macintosh disks in a future software release. Software currently available from DIT (Digital Instrument Technologies) can support direct Mac transfer.

The NeXTstations' standard 105MB hard disk demands a trimmed-down version of system software. But even in its reduced form, the system takes up 70MB, leaving little disk space for applications and data. The small disk won't trouble network users, who benefit from a central file server. Stand-alone users, however, will probably need either NeXT's optional 340MB hard drive (add about $2000 to the cost of the system) or an external SCSI hard disk. The new system software makes using third-party drives easier than in the past.

NeXT betters its board. An even closer look at the NeXTstation system board reveals space-saving omissions and performance-enhancing breakthroughs. Because there are no expansion slots on the NeXTstation (the NeXTcube includes three expansion slots), the NeXTstation board lacks a NuBus backplane connector for the NeXTBus. The NeXTstation accepts a maximum of 32MB of RAM using 4MB surface in-line memory modules (SIMMs)—half the Cube's maximum capacity—but more than enough for a single user's needs for the foreseeable future.

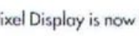
All new NeXT system boards employ the same custom chips that the original Cube used for managing direct memory access (DMA) and controlling peripherals (called the Integrated Channel Processor and the Peripheral Controller Chip, respectively). The Integrated Channel Processor is one of NeXT's major technical achievements. It provides DMA channels for SCSI and floppy devices, serial devices, Ethernet, the digital signal processor (DSP), the printer, sound, video, and virtual memory.

There are now more options for networking your NeXT: The new system board provides both thin Ethernet and twisted-pair Ethernet connectors. Twisted-pair Ethernet cuts network wiring costs by allowing the use of pre-installed, easy-to-troubleshoot telephone wire. In addition, there are two serial ports, a display port for the monitor, a DSP port for connecting digital or analog devices to NeXT's built-in DSP chip, a printer port, and a SCSI connector for attaching external hard disks, scanners, and CD-ROM drives.

The NeXTstation and NeXTstation Color

The most important features NeXT's newest systems boast are their low prices. Standard versions of the NeXTstation and NeXTstation Color sell for $4995 and $7995, respectively. Part and parcel of the new machines, which include an upgraded version of the original Cube, are a collection of hardware improvements that boost processing speed and allow the ability to share data with other users:

- NeXTstation models come in a case only 2 1/2 inches high, with no expansion slots.
- The 15-MIPS, 25MHz 68040 microprocessor at the heart of each system is roughly three times faster than its predecessor, the 68030.
- Fast hard disks and a floppy drive replace optical media as standard mass storage devices.
- Twisted-pair Ethernet (10BaseT), which permits low-cost networking over a telephone wire, joins the thin Ethernet (BNC) connector available on the original NeXT.
- The previous model's 25-pin SCSI connection has been upgraded to the improved 50-pin SCSI II standard.
- The black-and-white MegaPixel Display is now lighter and includes a built-in microphone.
- The new MegaPixel Color Display, when used with the NeXTstation Color, displays up to 4096 colors at 1120-by-832 pixel resolution.



The power of the Motorola 56001 DSP chip, introduced with the first Cube, is only beginning to be tapped by software developers and researchers. The chip processes a variety of signals in real time for applications such as speech and music synthesis compression, voice recognition, image processing, and the filtering of laboratory data in scientific and engineering applications. There was speculation that NeXT would choose the faster and more expensive 96002 DSP, Motorola's next-generation chip, but a lack of binary compatibility prevented that choice. The 56001 comes with 24KB of static RAM that may be upgraded with SIMMs to 576KB for more complex, memory-intensive signal-processing applications.

The SCSI connector conforms to the 50-pin SCSI II configuration, which permits longer cables with less noise interference than the 25-pin SCSI interfaces. An adapter cable sold by NeXT provides backward compatibility with the 25-pin SCSI interface. The data transfer rate of 4MB per second is the same as with the original Cube's 25-pin implementation, because the port is still SCSI I rather than SCSI II.

Black and white and color. I've used the original black-and-white Cube for the past year, and its crisp text and graphics have made it an absolute joy to work on. Like the original Cube, the black-and-white NeXTstation offers 2-bit, black-and-white graphics and a 17-inch MegaPixel Display, with keyboard and mouse interfaces and a speaker for playing back sound. The built-in microphone and an anti-glare screen are added bonuses.

For many users, the black-and-white machine will be the best video choice, since black and white is actually easier on the eyes. And if you're dealing primarily with text and reports that will be printed on a black-and-white laser printer, what you see on the screen is really all you need.

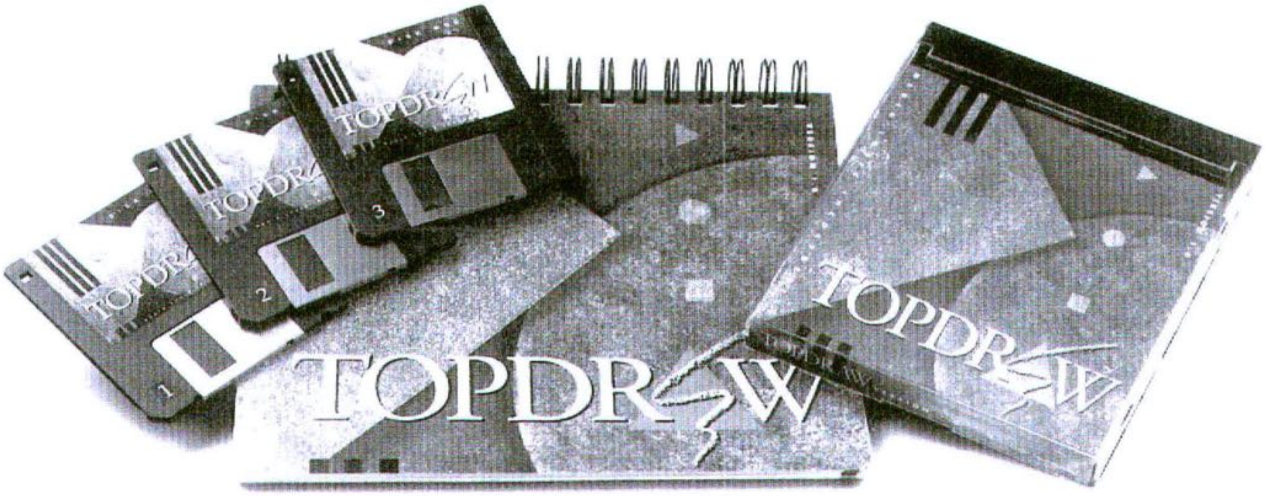
The NeXTstation Color's 16-bit video controller can display 4096 colors simultaneously and creates the effect of even more colors through dithering. Although the NeXTstation Color is positioned as NeXT's low-end color solution, its color graphics surpass the 8-bit color common on most high-end PCs and comparably priced workstations. The machine is more than adequate for business graphics, including charts or color presentations. Graphics professionals producing video, slides, or other high-quality images might use the NeXTstation Color for preliminary design work and then move the project to the NeXTdimension. The NeXTdimension board implements a 32-bit color scheme than can produce 16 million simultaneous colors (see "True Color" in this special report).

The NeXT's use of Display PostScript, a device-independent imaging model, ensures that color applications will run on any of the machines without alteration or special configuration. Color applications are displayed in black and white on the black-and-white NeXTstation, in 16-bit color on the NeXTstation Color, and in full 32-bit color on the NeXTdimension.

The NeXTstation Color system board differs from the NeXTstation board in memory configuration. It has a video and memory controller and a Brooktree RAMDAC (digital and analog converter) that performs conversions of red, blue, and green signals on a single chip. The NeXTstation Color requires more main memory than the NeXTstation, a minimum 12MB, to ensure display perfor-

Not an Artist?

Not a Problem.



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mance. In addition, the system uses 1.5MB of video memory, which allows the entire screen definition to be stored in the frame buffer.

To support the increased processing demands of color, the NeXTstation Color uses a main memory architecture called interleaved memory, which allows the overlap of read and write operations—similar to the way the Macintosh IIfx's "latched read and write" technique works. Interleaved memory requires different SIMMs (72-pin for color systems versus 36-pin for black-and-white), so the SIMMs can't be used in the NeXTstation or NeXTcube.

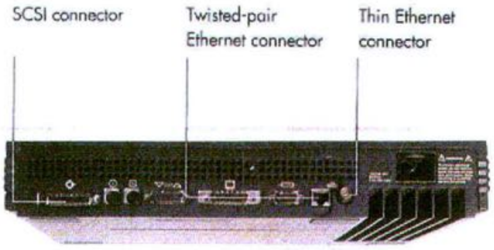
Because the NeXTstation Color was still in the preliminary design stage at the time of this writing, I was able to work with only a limited number of color demonstrations provided by NeXT. In those tests the NeXTstation impressed me with the same excellent performance as the other 68040 models.

NeXT's best choices. The NeXTstation, with a 105MB hard disk, MegaPixel Display, and 8MB of memory costs $4995. The NeXTstation Color with a 105MB hard disk, MegaPixel Color Display, Sound Box, and 12MB of memory is $7995. Even with the added cost of a larger, or second hard disk (probably a necessity for non-networked systems), both machines are priced much lower than comparable offerings from Apple and Sun. The selection of third-party applications remains limited compared to some other platforms, but impressive new products such as Lotus Improv and WordPerfect show that the situation is changing.

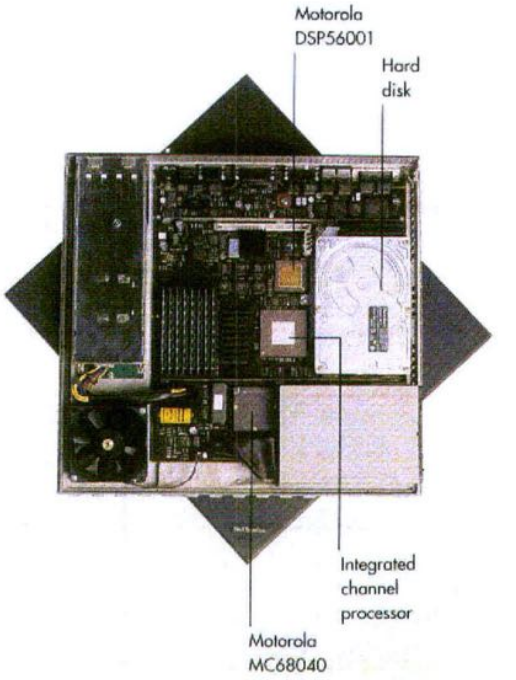
There is just one small dark cloud hovering over the NeXT products: Because of the various system board architectures, no upgrade path exists between the NeXTstation and the NeXTstation Color—a lack that could discourage buyers used to more modular, expandable systems. Owners of the NeXTcube can expand to a color system, but only to the leading-edge NeXTdimension. If black and white is all you need, however, and you don't require the expandability of the NeXTcube, the NeXTstation is an easy choice. It's an ideal system for a local area network environment or stand-alone users working primarily with office automation applications, desktop publishing, software development, or scientific applications.

Anyone considering a new system should keep in mind that all this new, impressive hardware comes with a substantial added bonus: NeXT's system software. With the NeXTstation and NeXTstation Color, you get state-of-the-art hardware and the elegance of the NeXTstep interface—a combination that's hard to resist.

Nicholas Baran *is the editor and publisher of* Baran's Tech Letter, *a newsletter covering NeXT Computers.*



The system features a silent cooling system and a compact 120W power supply based on a new technology called parallel resonance switching. Note the ports for either thin or twisted-pair Ethernet. The SCSI port uses the SCSI II 50-pin connector, which is backward compatible with existing SCSI devices, if used with a NeXT cable adapter.

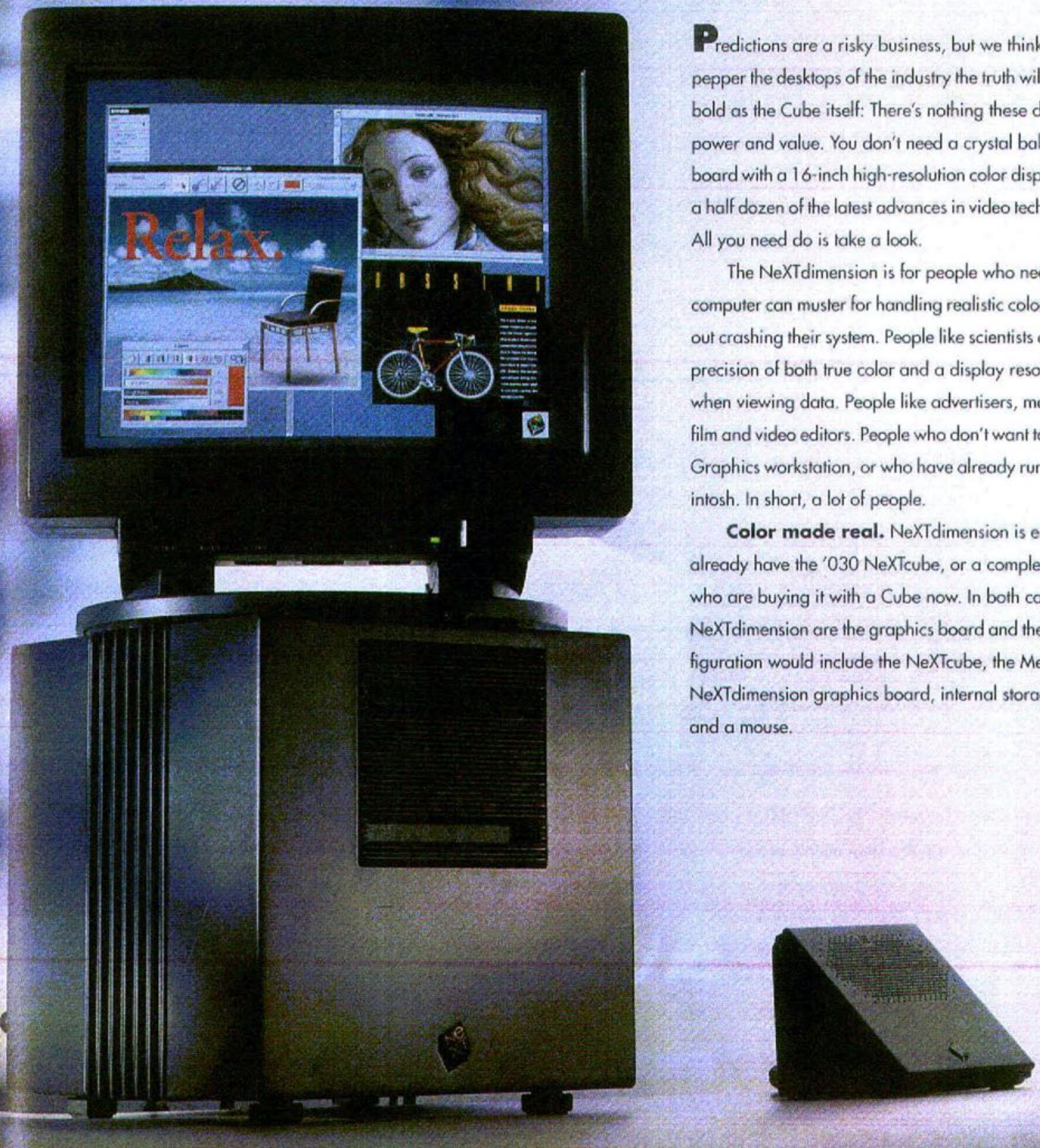


The NeXTstation system board is similar to the board in the NeXTcube. However, it does not include the NuBus interface connector to the NeXTBus. Note the absence of a floating-point coprocessor. Floating-point operations are integrated into the 68040. The NeXTstation Color system board includes 1.5MB of video memory and the Brooktree RAMDAC digital/analog converter.

True Color

NeXTdimension's breathtaking color sets several standards for desktop video.

by Rick Reynolds



Predictions are a risky business, but we think that as more color NeXTcubes pepper the desktops of the industry the truth will gradually emerge, as plain and bold as the Cube itself: There's nothing these days like the NeXTdimension for power and value. You don't need a crystal ball to appreciate a superb 32-bit board with a 16-inch high-resolution color display, a solution that fuses together a half dozen of the latest advances in video technology in one color workstation. All you need do is take a look.

The NeXTdimension is for people who need more power than a personal computer can muster for handling realistic color images easily and quickly, without crashing their system. People like scientists and engineers who want the lush precision of both true color and a display resolution of 92 dots per inch (dpi) when viewing data. People like advertisers, magazine and catalog publishers, film and video editors. People who don't want to pay in gold bullion for a Silicon Graphics workstation, or who have already run up against the limits of the Macintosh. In short, a lot of people.

Color made real. NeXTdimension is either an upgrade, for those who already have the '030 NeXTcube, or a complete color workstation, for those who are buying it with a Cube now. In both cases, the key components of the NeXTdimension are the graphics board and the color monitor, though a full configuration would include the NeXTcube, the MegaPixel Color Display, the NeXTdimension graphics board, internal storage, the Sound Box, a keyboard, and a mouse.

The graphics board fits into one of the Cube's NeXTbus expansion slots, and the monitor fits neatly right on your desk. NeXTdimension runs under System 2.0, with the original '030 NeXTcube or with the new '040 NeXTcube. For an additional $1495, users with the '030 can buy the upgrade to the '040. It's worth the cost. The new '040 motherboard will pick up some types of performance by a factor of three. Additional RAM will help as well. NeXTdimension requires the Cube to have 16MB of memory, but there's a noticeable improvement with 32MB, or 64MB if you can afford it. The same holds true for the NeXTdimension board itself: It comes with a standard 8MB, but can be expanded to 32MB. It works best with 16MB or more.

The 16-inch MegaPixel Color Display has a resolution of 1120 by 832 pixels (92 dpi), just like monochrome MegaPixel Display. Unlike the monochrome display, it doesn't come with a built-in microphone. NeXT put that feature in a separate Sound Box accessory, thereby allowing third-party monitors to work with NeXTdimension. The Sound Box is an integrated unit incorporating a speaker, a microphone, headphone jacks and RCA-style stereo output, a keyboard interface, a mouse interface, and support for all RGB-style monitors. Instead of a Sound Box you can run a monochrome MegaPixel right alongside your color MegaPixel to form one contiguous workspace.

Hotspots on the boardwalk. The NeXTdimension board is where most of the action is. A tour around the board reveals a RISC-based graphics coprocessor, a RAMDAC chip, and a high-speed compression chip, which, together with video input and output and 32-bit color Display PostScript, add up to an impressive bit of engineering. Let's examine the chips and video interfaces in turn.

The Intel i860 Reduced Instruction Set Computing (RISC) 64-bit chip runs at 33MHz and is rated by Intel at 80 million floating-point instructions per second. This means that the NeXTdimension board runs the color display at least as fast as the monochrome display, with some operations running even faster, preserving the snappy performance across the NeXT family.

Next on board are 4MB of VRAM (video memory) with support for double-buffered, 16-bit-per-pixel windows (these have not yet been implemented) and 8MB of DRAM, expandable to 32MB to increase the windowing capacity of the display. What this forest of acronyms means, quite simply, is that the NeXTdimension can simultaneously handle multiple "data-heavy" true color images as effortlessly as most personal computers handle windows of ordinary text. Brooktree Corporation's TrueVu RAMDAC makes it possible for each window to display in its own mode (black and white, grayscale, color, or video) while others display in theirs, whether the window is active or in the background. (On other platforms a window must be active to operate in video mode.) The RAMDAC accomplishes this through separate color maps for each window.

The compression chip included on the board is a CL550 Image Compression Processor chip, designed and built by C-Cube Microsystems, which uses the JPEG (Joint Photographic Experts Group) image compression algorithms, now a standard in the industry. Practically speaking, this chip gives you on-the-fly compression of video and bit-mapped images at user-selectable compression ratios of up to 30 to 1. This means that full-color, full-motion video is actually possible. Capturing full-motion video means capturing a stream of data flowing into your computer at approximately 33MB per second, and slightly more for compact disc–quality sound tracks. On-the-fly compression of this data is essential. How big did you say your hard drive is? You get the picture.

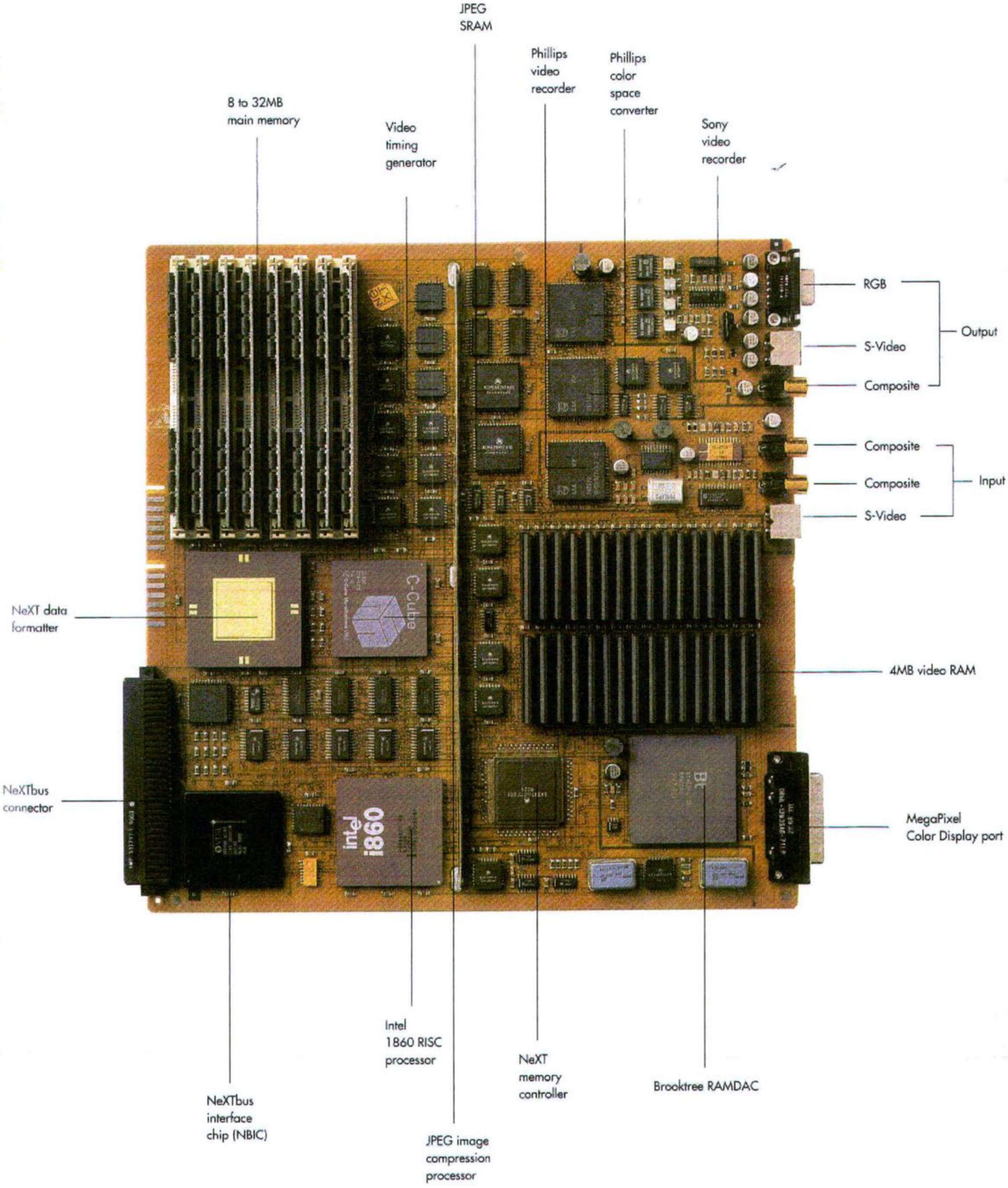
Finally, NeXTdimension supports video input and output to your VCR, laserdisc player, VHS, S-VHS, Hi-8, Beta, Camcorder, or still-video camera without requiring additional boards. Couple this with the DSP (digital sound processor) chip on every NeXT motherboard, and you have the necessary ingredients for high-quality video and sound—a multimedia platform, in short, that works. Which brings us to performance.

A real time for color. Picture a laserdisc player displaying full-motion video on a NeXT in one window, while you open a dozen huge color images in others. Place some images behind, say, the window of a car displayed on the screen, and see the images through the window (an example of the use of NeXTdimension's 8 bits of alpha channel for transparency). Do this on a network, with other background processes running, and then throw windows on top of each other, over and over, and try to notice a delay when the screen redraws itself. Do this until the system crashes. We couldn't get it to crash. Now test this on another computer. You can't even run the test.

Performance is not simply a question of speed, or of robustness, though a NeXTcube with NeXTdimension has both. Performance also means integration of video hardware and color system software, something nearly impossible to get if you're patching your system together from numerous sources. The obvious point of comparison here is a Macintosh, though Apple's 24-bit graphics card can't handle real-time video. To get that, you need to go to an expensive external box such as the one you get with Radius TV, Radius's 30-frame-per-second NTSC and 25-frame-per-second PAL solution. The box does not provide on-the-fly compression, however, and the video signal is actually only 16 bits, though 24 bits are displayed on the monitor. Companies like SuperMac are still working to develop cards with on-board compression and coprocessors fast enough for 30-frame-per-second video.

And the problems don't stop there. A Mac IIfx doesn't handle multiple 30MB color TIFF images well, has little multitasking ability (unlike the UNIX-based NeXT), and currently has no alpha transparency factor. The operating system has problems handling large hard drives without Apple's finicky Desktop Manager or BMUG's Desktop Secretary and is prone to INIT conflicts. And for high-powered networking, you're required to buy a plug-in Ethernet card if you want to improve your abilities for the network transfer of large files. The yet-to-be-released System 7.0 may handle some of these problems, but things like true multitasking may remain a sticky issue. With the Mac you're essentially coming up against the real barriers of a computer intended for personal use, rather than one designed to be an interpersonal workstation. The NeXTcube with NeXTdimension is in a different league from the Mac IIfx, but it costs less than a patched-together Mac system with similar capabilities.

In the case of the NeXT interface, the video software is an elegant version


JPEG SRAM
Phillips video recorder
Phillips color space converter
8 to 32MB main memory
Video timing generator
Sony video recorder
RGB
Output
S-Video
Composite
Composite
Input
Composite
S-Video
NeXT data formatter
4MB video RAM
NeXTbus connector
MegaPixel Color Display port
Intel 1860 RISC processor
NeXT memory controller
Brooktree RAMDAC
NeXTbus interface chip (NBIC)
JPEG image compression processor

of the usual simulated electronics equipment, and NeXTstep's color picker offers a choice of various color models, including RGB, CMYK, and HSB. Keep in mind that the NeXTdimension works with a full 32 bits of visual information, 8 bits apiece for the red, green, and blue channels, and a full 8 bits of alpha channel for transparency (the ability, for example, to "see through" the car window in the image discussed earlier). Keep in mind, too, that the NeXT uses the same description language, PostScript, for both display and printing, unlike the Mac, which uses QuickDraw for display. PostScript, as the current industry standard for imaging both graphics and text, has proved itself to be a flexible and evolving language—the abilities of PostScript 2, once it becomes available, will be reflected immediately on the NeXT monitors.

Real-time results. The workstation market won't feel the effects of the new '040 NeXTcube running NeXTdimension until some months after shipment, but from our first hard look, the platform is promising and exciting. Aside from the obvious color-hungry targets for the machine (such as magazine and newspaper publishers, scientists, and engineers), other markets include catalog publishers who handle long documents full of large color images too "heavy" for most desktop computers to handle, and advertising agencies, which need to massage high-quality color images daily. Expect to see key photo processing software migrating to the NeXT, just as Quark Xpress, Adobe Illustrator, and Aldus PageMaker are doing now. And of course, video editors, both corporate and professional, will use the new NeXT to develop multimedia presentations or portfolios of films and TV commercials. The robust environment of the NeXT, with its multitasking abilities, is a logical platform for these markets now that NeXTdimension can provide true 32-bit color.

Further implications of NeXTdimension (and upcoming solutions like it) move outside the specialized DTP and multimedia markets, however, and point to a deeper wedding of home television to computers. Up until now, this market has been the dream world of visionaries at places like MIT's Media Lab. With the breakthrough of a computer that can handle real-time video processing at NTSC speeds, you may have a real prototype for a computer TV of the future (see "Vanishing Point" in this issue for Nicholas Negroponte's views on the matter). That's a mass-market for a computer item: The same people who buy TVs. It's also a revolutionary computer that could change key aspects of your life.

Imagine, then, being able to buy one NeXT-like machine instead of both a computer and a TV for your home. Imagine seeing your favorite TV programs on it during dinner, and then turning off the outside TV signal after you're done watching it so that you can use it locally—as a computer. Or picture it set up to capture your favorite CNN newscasts or pay-TV cable movies on disk. The computer then becomes a true multimedia information center for the home, one that handles a television signal as easily as it handles a software program.

This is truly the next dimension in television, one that brings a key piece of the future right to the cutting edge of the microcomputer world. ■

Rick Reynolds *is executive director of the Bay Area NeXT Group and owner of a Macintosh and NeXT graphics service bureau in San Francisco.*

The NeXTcube

The NeXTcube is the inheritor of the original chassis, a 12- by 12- by 12-inch black magnesium cube. Both the original NeXT machines and the new 68040-based models are called NeXTcube.

Both versions of the Cube have a heavy-duty power supply and two full-height bays. Both also have four NeXTbus expansion board slots, one of which is used for the logic board. The NeXTdimension fits into one of these NeXTbus expansion slots. Other boards for the expansion slots include high-end audio boards, mid-level color boards, and video-processing boards.

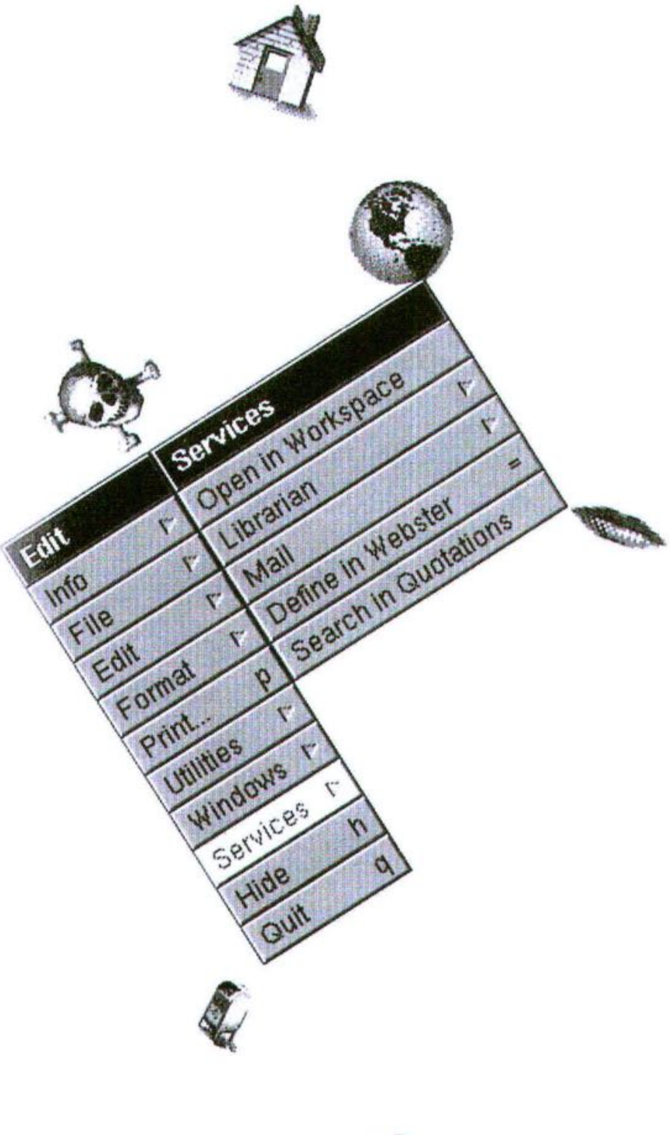
The old Cube came preconfigured with a 256MB read and write optical drive and one slot for a SCSI hard drive if desired (and we all desired). The new Cube sports a new faceplate to allow access to several devices at once. The Cube also comes with a list of configured elements to choose from: CD-ROM, read and write optical, 330MB through 1.4GB hard drives, or a 2.88MB 3.5-inch floppy drive.

The strong points of the NeXTcube configuration are the flexibility of configuration, the expansion capacity available through the three extra NeXTbus slots, and the SIMM slots for additional main RAM and DSP SRAM. The old Cube can easily be upgraded to the new NeXTcube technology. As future generations of motherboards become available beyond the '040, they will also be available to upgrade the old Cube.

NeXTstep 2.0

NeXTstep Release 2.0 brings the goal of interpersonal computing even closer.

by Charles L. Perkins



Making a successful interpersonal computer boils down to one thing: enabling people at personal workstations to share information—be it text, graphics, sound, or a combination of these—simply and easily. NeXT hardware and the UNIX Mach operating system provide the raw capacity for this. From the '040 processor to the DSP, the NeXT is designed to handle all kinds of information efficiently. Mach provides the power of networking and file sharing. It's the job of NeXTstep, NeXT's graphical front end to UNIX, to make all that power transparently available to the person at the machine.

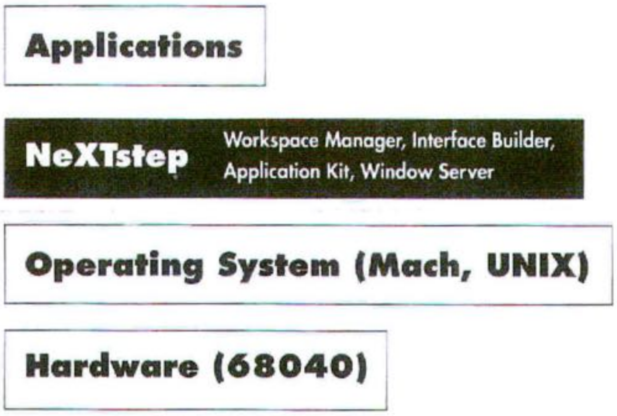
In his inventory of the original NeXT machine's wins and losses, Steve Jobs pointed to NeXTstep as the computer's pride. NeXTstep made UNIX something the average person could use and made it easy for third-party applications to achieve consistency with the look and feel of the NeXT environment. And significantly, NeXTstep included multimedia e-mail as an integral part of the system.

Release 2.0, introduced on September 18 with NeXT's new hardware, enlarges NeXTstep's foundation for interpersonal computing in a variety of ways. New features and improvements such as on-line fax and a streamlined mail system make sharing information even easier than before. And NeXTstep now expands the range of information you can share by supporting color, animation, video, and the image and sound compression hardware built into some of the new NeXTs.

Other improvements foster interpersonal computing simply by making the personal part easier. Menus throughout NeXTstep's Workspace Manager, bundled applications like NeXTmail and Digital Librarian, and third-party applications written to NeXT's 2.0 interface specifications, are more intuitive and consistent than 1.0 versions. Many more user preferences and controllable parameters are accessible from the interface directly, rather than only from the UNIX command line.

The new NeXTstep also irons out several wrinkles in interapplication operability. A new Services command makes developer-specified functions of one application available within any other. Throughout the system, users will be surprised by the interapplication options available by just dragging icons from one application to another. For example, to copy a file received in NeXTmail into a directory, you simply drag the icon into the appropriate folder in the Viewer window. To search it with Digital Librarian, you just drag it onto the Librarian's bookshelf.

Another key improvement: 2.0 is fast. Performance tuning in Release 2.0 cuts application start-up times almost in half, makes printing a background process, and allows for blink-of-an-eye switching among applications. And that's


Applications
NeXTstep
Workspace Manager, Interface Builder, Application Kit, Window Server
Operating System (Mach, UNIX)
Hardware (68040)

NeXTstep resides between the UNIX Mach operating system and user applications, providing a graphical user interface, an application interface builder, a set of objects on which applications can call, and the Display PostScript imaging system.

on a 68030-based system. The new 68040 machines run everything three times faster, speed up PostScript display drawing by a similar factor, and are an order of magnitude faster at floating-point calculations. For those infrequent times when something does take more than a few seconds, NeXT provides a spinning wait cursor to alert you that something is happening. In the meantime, you can move to a different application while the NeXT's multitasking system continues the operation in the background.

The Workspace Manager. The first version of NeXTstep presented a well-thought-out workspace, boasting an elegant menu system and the trademark application dock (which aligns user-designated key applications in a row of icons down the right side of the screen for instant access). Seams were apparent, however, in the Directory Browser (called the File Viewer in Release 2.0), which made the user jump through hoops to carry out such basic functions as copying files.

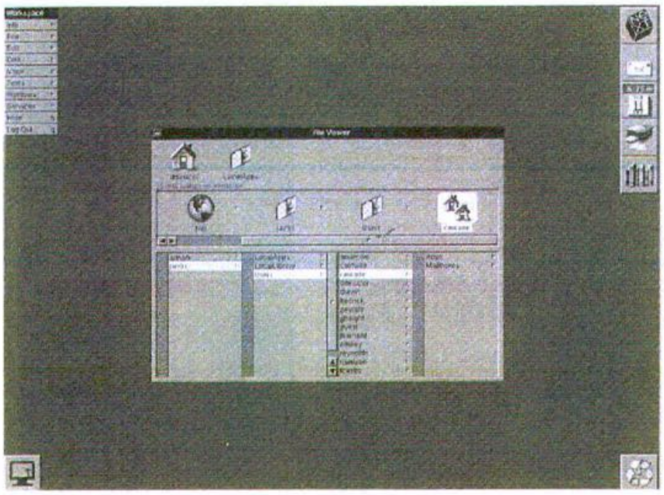
In Release 2.0, the Workspace Manager's File Viewer takes the leap toward a much more elegant graphical interface. The redesigned 2.0 model carries forward the vertical and horizontal file-listing structure from 1.0's Browser, but adds an iconic superstructure that makes navigation through a network and copying files much easier.

The row of icons that tops the file listing in 2.0's File Viewer gives users an at-a-glance reading of their path through the network. Clicking on an icon brings the user directly to the pictured file or folder; double-clicking opens it. Users can access files or folders quickly by dragging the icon onto the upper "shelf," where it stays available until it's dragged off the Viewer. The shelf also obviates the less-than-intuitive tactic, necessary in 1.0, of opening two Browsers in order to copy a file. To move a file, you need only drag it onto the shelf, navigate to the destination folder, then drag the icon off the shelf into its new home.

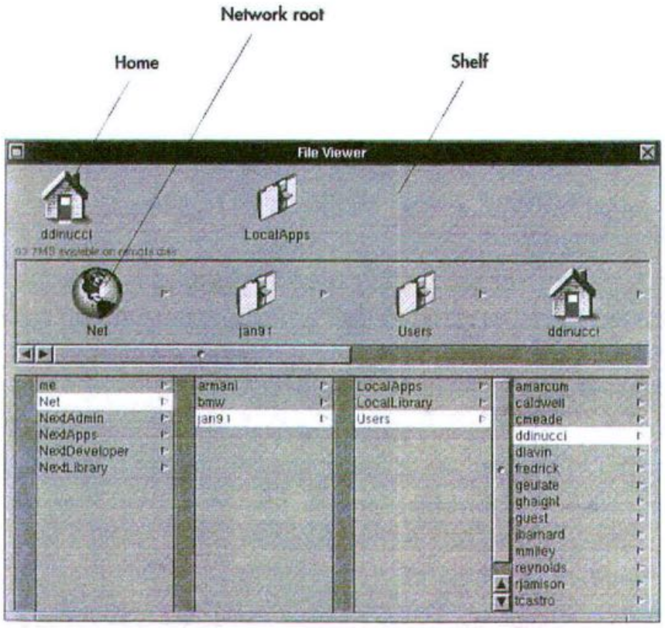
The strengths of this system are especially apparent on networked NeXTs. Users effortlessly navigate to any file on the network using the graphic path. The underpinning of the UNIX operating system shows its stuff when you try to copy a file in another user's directory. UNIX's system of permissions determines your read and write access, while the NeXTstep interface translates UNIX's error messages into visual metaphors and NeXT message panels.

A new Tools menu in the workspace provides several welcome accessories. A Processes command calls up a panel that lets you monitor or terminate applications easily. A new Finder finds files in any directory, using regular expressions or wildcards, like "*.tiff." Inspectors enable the user to view the attributes of any file, associate document types with specific applications or override the default association, and compute the sizes of and change permissions for directories and their contents. A bonus feature of the Inspector lets you quickly view the contents of EPS and TIFF files.

A new command, Services, can appear in the main menu of any application written to run under 2.0. The Services command allows the developer-

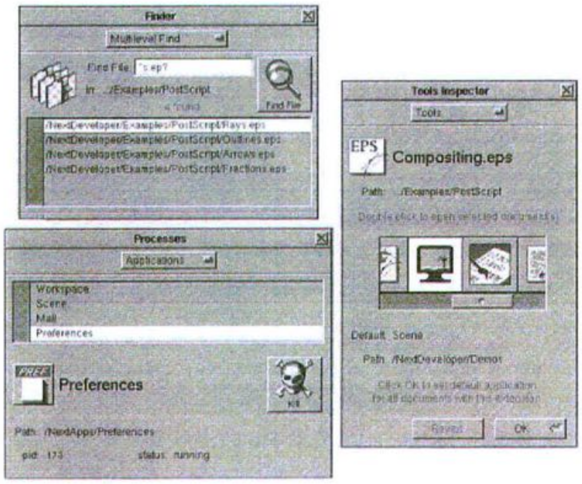


The Release 2.0 workspace is familiar from the earlier release. Users will see differences, however, in the menus and File Viewer.


Network root
Home
Shelf
File Viewer
ddinucci
LocalApps
Net
jan91
Users
ddinucci

me	armani	LocalApps	amarcum
Net	bmw	LocalLibrary	caldwell
NextAdmin	jan91	Users	cmeade
NextApps			ddinucci
NextDeveloper			dlavin
NextLibrary			fredrick
			geurate
			ghaight
			guest
			jbarnard
			mmiley
			reynolds
			rjamison
			tcastro

An icon path above the file lists shows the path through the network to the selected file. Users can drag the icons of frequently accessed files and directories onto the shelf, where they are instantly available.


Finder
Multilevel Find
Find File
Tools Inspector
Tools
Processes
Applications
Kill
Revert
OK

Find File: *.ep?
In: ../Examples/PostScript

/NextDeveloper/Examples/PostScript/Rays.eps
/NextDeveloper/Examples/PostScript/Outlines.eps
/NextDeveloper/Examples/PostScript/Arrows.eps
/NextDeveloper/Examples/PostScript/Fractions.eps

Workspace
Scene
Mail
Preferences

Preferences
Path: /NextApps/Preferences
pid: 173 status: running

Compositing.eps
Path: ../Examples/PostScript
Default: Scene
Path: /NextDeveloper/Demos

The Finder, Processes, and Inspector panels are all available through the Tools command in the Workspace menu. The Finder finds a file anywhere in the directory system. The Processes panel lets users interrupt and otherwise control applications and background processes. The Inspector panel lets you inspect the attributes and change the associated application for any file, and lets you inspect the contents of sound, TIFF, and EPS files.

designated functions of one program to be utilized by all other applications, present and future—another giant step toward an important goal in making computing interpersonal. At press time, this menu offered access to features of the Workspace Manager, Digital Librarian, Digital Webster, NeXTmail, and Quotations. However its real power will be exploited as third-party products link up to this powerful system of interapplication communication by "publishing" other services.

The medium is the message. Spearheading NeXT's claims to interpersonal computing is its mail system, which, when combined with the computer's networking abilities and outstanding multimedia capabilities, provides the NeXT with an unrivaled system for sharing information of any sort. The strength of NeXTmail has always been its ability to include formatted files of almost any type within a message. For example, if the sender wants to include a WriteNow or spreadsheet file, he or she need only drag the file icon into the NeXTmail message and drop it there. To read it, the recipient merely opens the NeXTmail message and double-clicks on the file icon. (To open the file, the recipient must have the right application, though it, too, could be sent via NeXTmail just as easily.) Network users can send graphics, text, and, most amusingly, Lip Service voice messages in this way.

In Release 2.0, NeXTmail has been enhanced with a mail filter for non-NeXT destinations, an archive for outgoing messages, a resizable Mailboxes window, and a return receipt that is sent when your mail is read. Messages can now display EPS and TIFF images, and you can drag files out of NeXTmail windows as well as into them.

Another major communication facility has been subtly added to the Print panel, in the form of a Fax button. This new option enables users to print the current document, or any part of it, to any specified fax. A ready-made cover sheet is even supplied.

Bundled up. Mail is only one of the key applications bundled with every NeXT system. The two system packages, the standard version and the extended version, are differentiated by the list of applications bundled with each (see the sidebar "Software 2.0"). To squeeze Release 2.0 onto the new computers' 105MB hard disks, NeXT has trimmed away some of the less crucial applications that were bundled with Release 1.0. The smaller package still includes WriteNow, Digital Librarian, NeXTmail, and Digital Webster, as well as most system tools. The extended version includes application development tools, including the revolutionary Interface Builder, plus a collection of the complete works of Shakespeare.

Digital Librarian, a text search and indexing utility, offers a new look and a substantial speed-up in Release 2.0. Users can load any document into the new "bookshelf" window in the same way they drag icons onto the shelf in the File Viewer. NeXT's user and technical documentation is already loaded in. Bookshelves can be saved and restored, and more than one can be open at a time. The Librarian can quickly open special windows for rich text format files and UNIX manual pages. Luckily, almost all of Release 2.0's documentation is stored in RTF files, which open in a second or two—welcome relief from those interminable WriteNow start-ups that caused pervasive Release 1.0-documentation-avoidance syndrome.

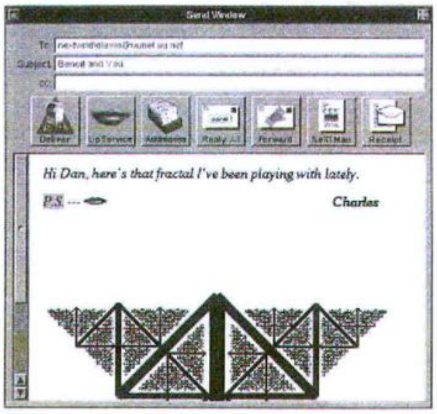
Heartening signs of NeXT's advance toward its ultimate goal of a seamless, predictable interface are visible throughout the package of bundled applications. Many of the new features of the Edit application reflect the Application Kit's improved Text class. Here, and anywhere there is editable text, such as in NeXTmail, you can align paragraphs left, center, and right; use rulers for margins and tab stops (and copy these rulers into other text); underline, subscript, and superscript; spell-check; and navigate through and select text using a plethora of new arrow key commands. In addition, Edit provides a new structure parser that collapses portions of documents into icons that can be expanded later with a click—wonderful for outlines and source code browsing.

In Release 1.0, you were forced to leave NeXTstep behind and drop down fairly frequently to the UNIX command line to monitor processes and memory usage, search for files using regular expressions, change ownership of directories, and other such tasks. Release 2.0 handles most of these functions directly in the workspace, although actions such as changing the case-sensitivity of the File Viewer and some aspects of network administration still require you to take the dive into UNIX through the Terminal application. The old Terminal and Shell applications have been replaced by a new Terminal application that combines the capabilities of both. Based on the popular VT100 emulator called Stuart, the new Terminal offers nice preferences and printing options, and in general provides a simple but satisfying way to deal with UNIX.

Input/Output. NeXTstep 2.0 supports a broad range of image and sound formats, including Group 3 FAX, various compressed TIFF formats, and a new CD-quality sound format featuring two-to-one compression with no loss of quality that records and plays in real time. (The compression ratio can be raised to six-to-one with some loss of fidelity.) Some new media formats, such as video and animation, are partially integrated into 2.0. Languages besides English are now supported throughout the whole system, and special keyboards and keyboard mappings can be used for non-English language input (a Kanji version is still under development).

Release 2.0 supports several new input devices, including pen-based input tablets. It also supports CD-ROM disk drives, in addition to the 2.88MB floppy drive, which Release 2.0 users can use to read and write 1.44MB and 720KB MS-DOS floppies—but not Mac disks—directly in the Workspace Manager.

NeXTstep's new display output abilities again prove the advantage of using device-independent Display PostScript as the NeXT imaging model. All applications written for Release 1.0 will run on the new color hardware without modification. Likewise, 2.0-compliant applications require no special configuration


Send Window
Deliver
Lip Service
Addresses
Reply All
Forward
NeXTMail
Receipt

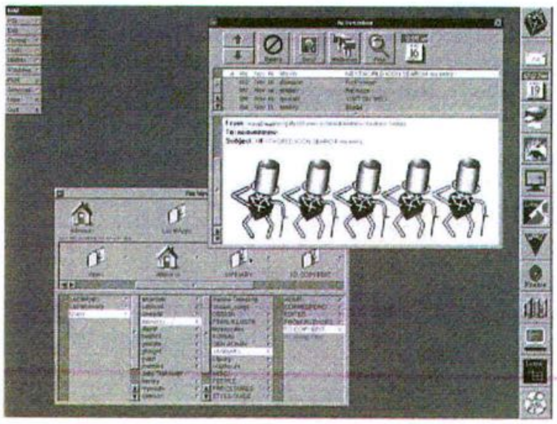
Subject: Benoit and You

Hi Dan, here's that fractal I've been playing with lately.

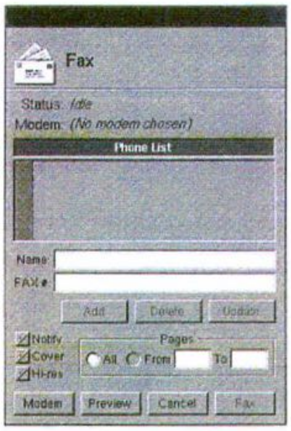
P.S. ---

Charles

NeXTmail messages can include formatted files of any type, which the addressee can open by double-clicking the icon, or drag into his or her own directory. The Lip Service option lets you record voice messages for inclusion. New options in Release 2.0 let the sender strip NeXT-specific coding from messages for delivery to non-NeXT addresses and request a receipt.

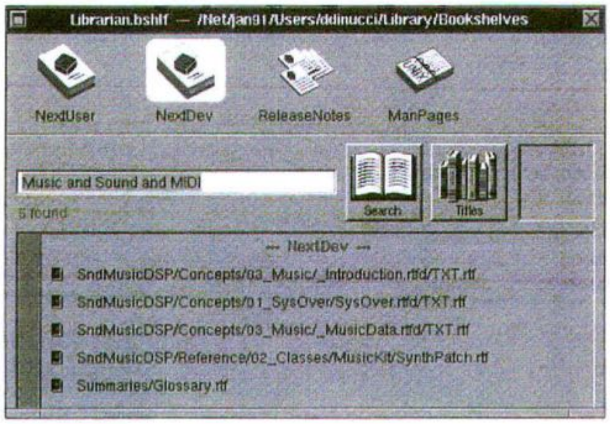


Files received in NeXTmail can be dragged directly into a directory in the File Viewer. In the same way, any file can be dragged onto a bookshelf in Digital Librarian.


Fax
Phone List
Add
Delete
Update
Pages
Modem
Preview
Cancel
Fax

Status: *Idle*
Modem: *(No modem chosen)*
Name:
FAX #:
☑ Notify
☑ Cover
☑ Hi-res
● All ○ From To

A Fax button in the Print menu lets users send documents directly to specified fax numbers. NeXTstep even includes a preformatted cover sheet.

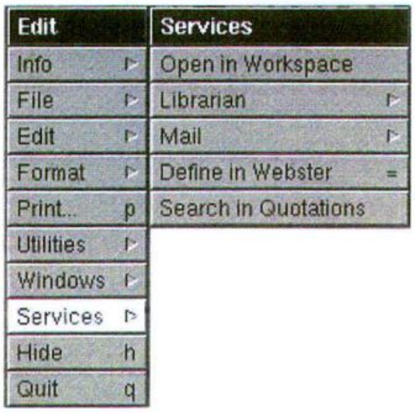

Librarian.bshlf — /Net/jan91/Users/ddinucci/Library/Bookshelves
NextUser
NextDev
ReleaseNotes
ManPages
Search
Titles
— NextDev —

Music and Sound and MIDI

5 found

- SndMusicDSP/Concepts/03_Music/_Introduction.rtfd/TXT.rtf
- SndMusicDSP/Concepts/01_SysOver/SysOver.rtfd/TXT.rtf
- SndMusicDSP/Concepts/03_Music/_MusicData.rtfd/TXT.rtf
- SndMusicDSP/Reference/02_Classes/MusicKit/SynthPatch.rtf
- Summaries/Glossary.rtf

Digital Librarian's new interface includes bookshelves onto which users can drag any document they want to search.


Edit
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File
Edit
Format
Print... p
Utilities
Windows
Services
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Services
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Librarian
Mail
Define in Webster =
Search in Quotations

The new Services menu, which appears within any 2.0-compatible application, makes the power of one application available within all others. Currently only a few applications provide Services, but more should quickly become available.

to display properly on either the grayscale MegaPixel Display or the new color displays. On a system with two monitors attached, it is even possible in Release 2.0 to drag windows from a grayscale display onto a color display and back again. All dithering and color conversion is performed automatically by the PostScript layer.

Release 2.0 provides a Color panel from which users can pick colors using a staggering variety of color models (RGB, HSB, CYMK, grayscale, and more) and drop them into the "color wells" that are scattered throughout the system. Unfortunately, not many applications have color wells yet—perhaps a side-effect of the fact that even on color monitors, the basic NeXT user interface maintains its distinctive grayscale look.

Toward the goal. The many improvements to NeXTstep bring the ideal of interpersonal computing closer in a number of subtle but important ways. Interpersonal computing is based on more than just e-mail or interoperating applications. It is based on the ability to manipulate information in powerful, intuitive ways. NeXTstep represents this ideal and is getting ever closer to realizing it. NeXT's interface allows users to "reach out and touch" information symbolically, in a natural, predictable way, on their own workstation and throughout a network. The NeXT's, and NeXTstep's, ability to handle multiple modalities—speech, music, graphics, and video—enables users to communicate in almost any form that best expresses the information. And interpersonal computing doesn't have to stop there. Future extensions could swap data with applications running on other systems, allow users to view each other's displays, and launch applications on other computers more easily.

Although NeXTstep doesn't provide the best available implementation of every function, the way its parts work, separately and together, and the degree of control it gives the user over the environment, are unprecedented. NeXT computers, combined with the NeXTstep interface, constitute a package with the rare ability to provide an easy interface for novices without restricting the freedom of more experienced users.

Despite all the improvements, NeXT alone cannot deliver on the promise of interpersonal computing. Real power will come only when third-party applications take advantage of the NeXT environment. Release 2.0–compliant applications that provide Services to other programs will be a big step. Until a critical mass of useful third-party applications appears, it is too soon to tell whether NeXT's vision of interpersonal computing will take root on desktops around the world. But with NeXTstep's easy tool-building and much-improved consistency and integration, NeXT has provided a compelling base.

Release 1.0 users who have optical disk drives can upgrade to Release 2.0 Extended for $195. ⌽

Charles L. Perkins, *a NeXT developer and Ph.D. candidate at Harvard University, is a senior associate with Marble Associates in Waltham, Massachusetts.*

Software 2.0

NeXTstep 2.0 is available in two configurations. The slimmed-down standard version is preinstalled on systems equipped with 105MB drives. If your NeXT system is equipped with a 340MB or larger hard disk, it comes with the complete, developer-oriented extended version.

Release 2.0
includes the following applications:

End-User Applications
Workspace Manager
Edit
Digital Librarian
NeXTmail
Preferences
Preview for PostScript
PrintManager
Webster's Ninth New Collegiate Dictionary
Webster's Collegiate Thesaurus
WriteNow Word Processor
DataVizBridge (DataViz)

Developer Tools
VT100 Terminal Emulator

System Administration Applications
MailManager
NetInfoManager
NetManager
PrinterTester
UserManager
Installer

Release 2.0 Extended
includes these additional programs:

End-User Applications
Oxford Dictionary of Quotations
William Shakespeare, *The Complete Works*
TeX Document Processing System (Radical Eye Software)

Developer Tools
Interface Builder
Objective-C Language Compiler
C++ Language Compiler
Objective-C Class Definitions
56001 DSP Tools
GNU Emacs
GNU Debugger
BUG-56 Debugger (Ariel)
Malloc Debugger
AppInspector
PostScript Tools
Application Kit
Music Kit
Sound Kit
On-line Technical Documentation

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soon to tell whether
desktops around the
nproved consistency

grade to Release 2.0

ersity, is a senior associate

"In the 1980s, personal computers accomplished their mission: to radically improve individual productivity.

But that's just not enough anymore.

WHY THE WORLD NEEDS A NEW COMPUTER.

In the 1990s, competitive advantage will come from improving the productivity of entire groups, so they can stay ahead of a world that's changing faster than ever.

The personal computer revolutionized the way we worked in the 80s.

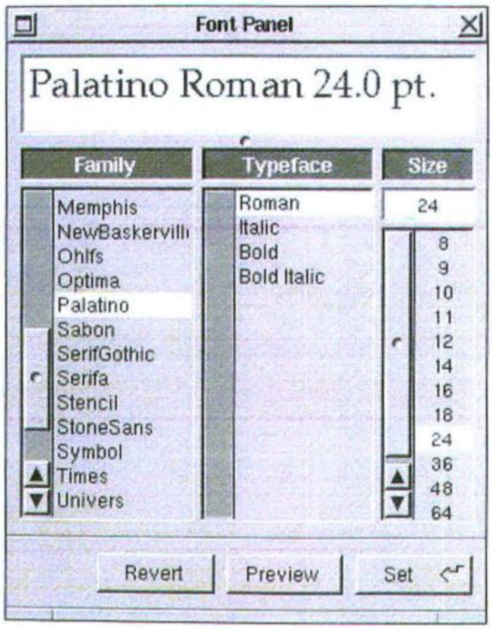
The next 15 pages may well change the way we work in the 90s." *–Steven Jobs*

WELCOME TO THE NeXT WORLD.

In the computer industry, we've grown used to seeing advances on an almost daily basis. But the true milestones haven't been quite so bountiful.

In fact, in the last 15 years, there have been only two:

The spreadsheet, which was responsible for launching the personal computer revolution back in the 70s. And desktop publishing, which fueled the graphical revolution of the 80s.


Font Panel
Palatino Roman 24.0 pt.
Family
Typeface
Size
Memphis
NewBaskervill
Ohlfs
Optima
Palatino
Sabon
SerifGothic
Serifa
Stencil
StoneSans
Symbol
Times
Univers
Roman
Italic
Bold
Bold Italic
24
8
9
10
11
12
14
16
18
24
36
48
64
Revert
Preview
Set

Even now, years later, these applications remain the two biggest reasons why people buy and use computers.

But in the 90s, we're facing challenges personal computers were never designed to meet.

There's less time to react. Competition is much more

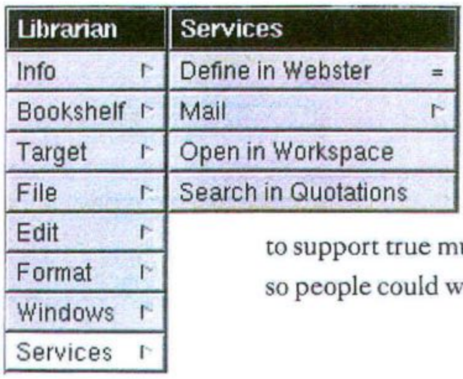
sophisticated. Organizations need better ways to tap the resources they already have.

And so the need for a third revolution becomes more and more clear.

No longer is it enough to boost an individual's productivity and creativity (which is what you can expect with traditional computers running traditional applications).

There's infinitely more to be gained by empowering groups of people to work more productively and creatively together.

To make this happen, we have to invent a technology that radically enhances human-to-human interaction. A technology that raises group productivity in as revolutionary a way as the spreadsheet and publishing raised individual productivity.


Librarian
Info
Bookshelf
Target
File
Edit
Format
Windows
Services
Services
Define in Webster
Mail
Open in Workspace
Search in Quotations

We have to turn personal computing into interpersonal computing.

To bring this new way of working to business and education, we created a computer company dedicated to the task. We called it NeXT, Inc. And we filled its ranks with many veterans of the preceding revolutions.

We started in the only logical way – by taking a long hard look at current technology.

In the personal computer, we saw a machine already stretched beyond its limits, not at all optimized for a connected world. We looked at workstations, but they were so complex, only our engineers could figure out how to use them.

Clearly, a machine designed for a world of interpersonal computing would have to be very different.

It would have to be built for networking, to make interaction effortless. It would have to offer an e-mail system more advanced than anything we've used before. It would have to support true multitasking, so people could work naturally,

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even first-time
users could sit c
put it to work.

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You'll see how
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actually revoluti
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It would have
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Send

doing several things at once.

And, if there's any lesson to be learned from the past, this new machine would have to be so perfectly intuitive, even first-time computer users could sit down and put it to work.

That's the thinking that resulted in the first NeXT™computer. And it's the same thinking that has allowed us to create a new computer, affordable enough to be used by everyone:

The NeXTstation™ computer.

We'd like to take the next 13 pages to show you the many extraordinary things it can do. And some of the even more extraordinary things it can help people do.

You'll see how we designed the NeXTstation from the first chip to be something new: a strategic tool that can actually revolutionize the way an organization works. Whether that organization operates in a few rooms or several different countries.

We'll show you how the NeXTstation offers a perfect environment for financial analysis and publishing. And how, at the same time, it enables software developers to rethink the way we solve problems – to reinvent the spreadsheet, and eliminate the compromises of desktop publishing.

We'll show you a machine less confining than any personal computer you've ever seen, yet even easier to use.

Welcome to the new world.

IN OUR WORLD, LOTUS REINVENTS THE SPREADSHEET.

We say, "Here's a new computer." You say, "Let's see the software." It's a perfectly human reaction.

So rather than start by talking about processors and megahertz, we'd like to start by showing you the impressive things you can do with the NeXTstation. Today.

On this display is Improv,™ from the creators of Lotus 1-2-3.® While at first glance it may look suspiciously like an ordinary spreadsheet, it could very well change the way people look at forecasting and analysis.

In Lotus' own words, "With Improv, we have literally reinvented the spreadsheet – a job that was made much simpler by NeXT technology."

The revolution of Improv is that once you've entered your data, you can easily rearrange it in countless new ways – and gain insights you could never get from a traditional spreadsheet.

That's because Improv isn't structured like a traditional spreadsheet. To understand exactly how it works, take a look at the column and row headings in the sample screen.

Rather than use letters and numbers to describe data, it lets you use real words, like "Tons" and "Dollar Value."
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Instead of seeing sc
"=BD2*BD3," you
Value = Tons*5.75."
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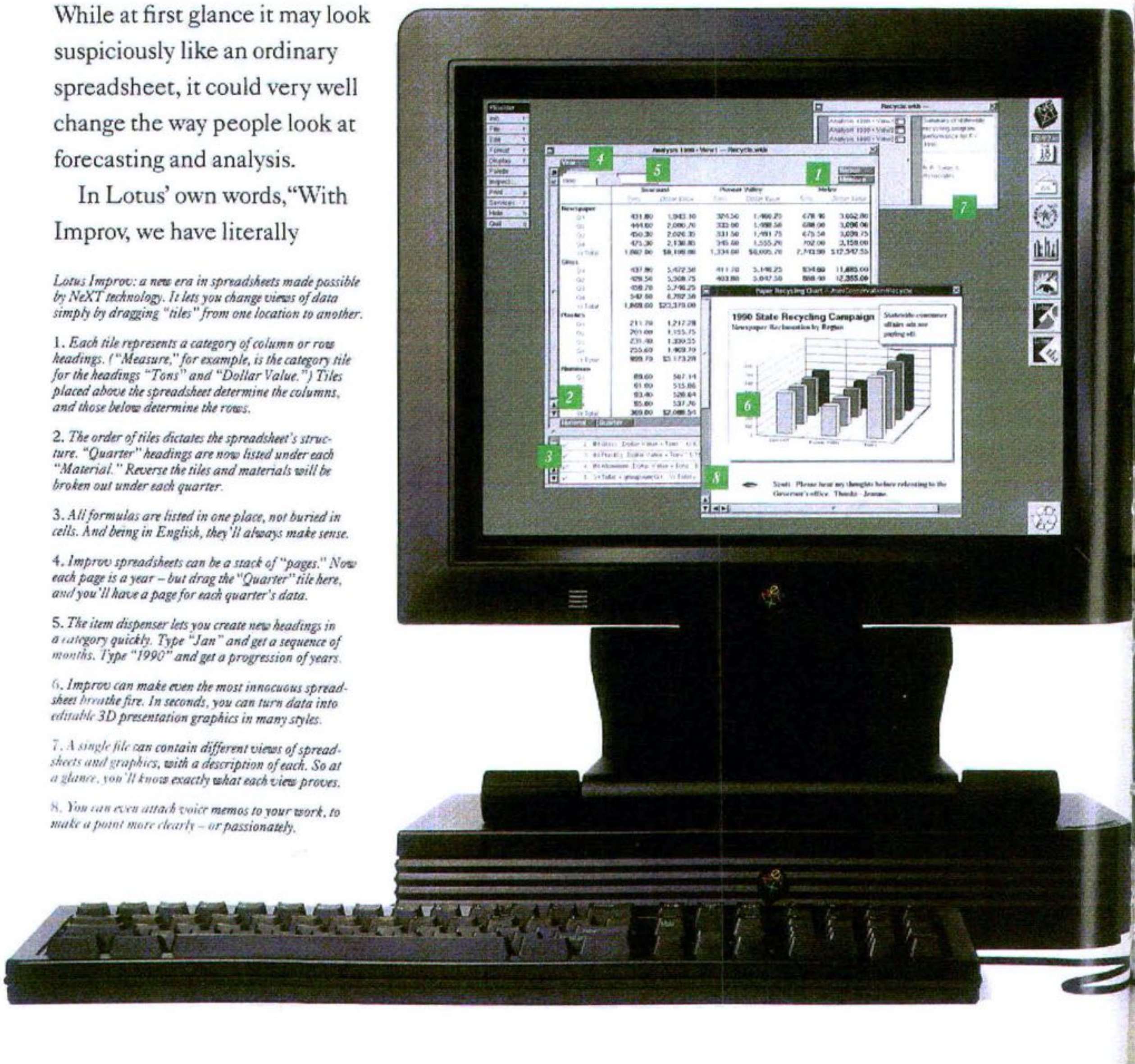


Lotus Improv: a new era in spreadsheets made possible by NeXT technology. It lets you change views of data simply by dragging "tiles" from one location to another.

1. *Each tile represents a category of column or row headings. ("Measure," for example, is the category tile for the headings "Tons" and "Dollar Value.") Tiles placed above the spreadsheet determine the columns, and those below determine the rows.*

2. *The order of tiles dictates the spreadsheet's structure. "Quarter" headings are now listed under each "Material." Reverse the tiles and materials will be broken out under each quarter.*

3. *All formulas are listed in one place, not buried in cells. And being in English, they'll always make sense.*

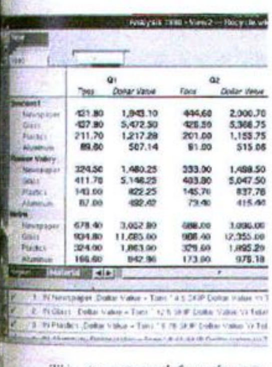
4. *Improv spreadsheets can be a stack of "pages." Now each page is a year – but drag the "Quarter" tile here, and you'll have a page for each quarter's data.*

5. *The item dispenser lets you create new headings in a category quickly. Type "Jan" and get a sequence of months. Type "1990" and get a progression of years.*

6. *Improv can make even the most innocuous spreadsheet breathe fire. In seconds, you can turn data into editable 3D presentation graphics in many styles.*

7. *A single file can contain different views of spreadsheets and graphics, with a description of each. So at a glance, you'll know exactly what each view proves.*

8. *You can even attach voice memos to your work, to make a point more clearly – or passionately.*



This view was made from the same
left. All we did was drag the "Quart
and "Region" tiles to new positions

Or look at it another way. With Imp
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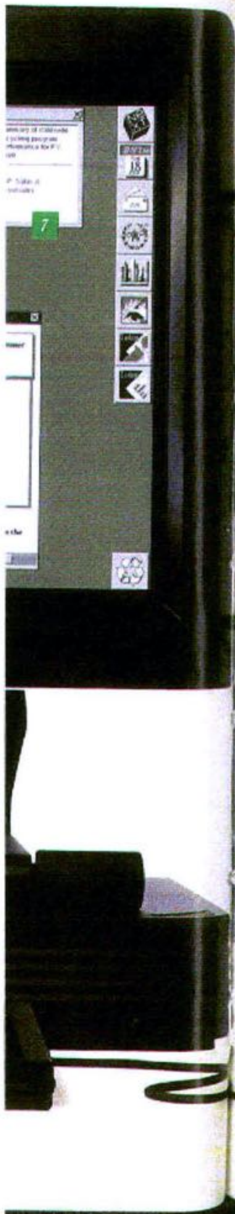
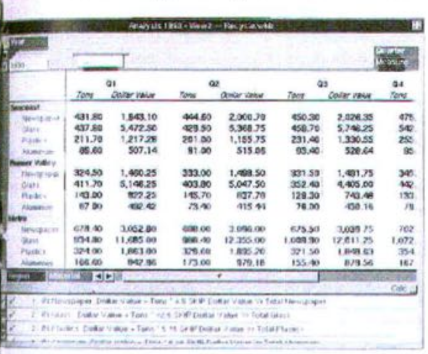


and "Dollar Value." Or anything you're comfortable with.

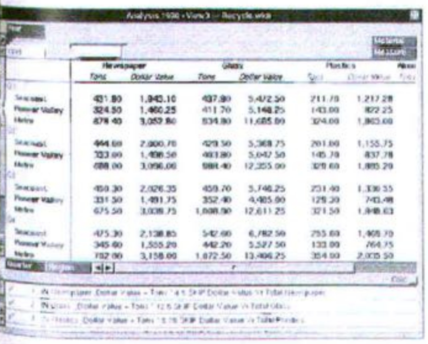
The benefit of this is that now your formulas read like English. Instead of seeing something like "=BD2*BD3," you see "Dollar Value = Tons*5.75."

And Improv lists all your formulas in one place, as opposed to hiding them in individual cells. So when you revisit a complicated spreadsheet months later, it's sure to make sense. Likewise if you're looking at a spreadsheet that's been designed by someone else.



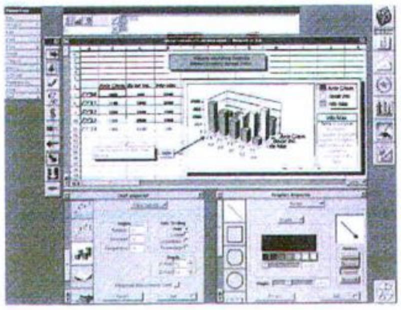
	Q1		Q2		Q3		Q4
	Tons	*Dollar Value*	*Tons*	*Dollar Value*	*Tons*	*Dollar Value*	*Tons*
Seacoast							
Newspaper	431.80	1,943.10	444.60	2,000.70	450.30	2,026.35	475
Glass	437.80	5,472.50	429.50	5,368.75	459.70	5,746.25	542
Plastics	211.70	1,217.28	201.00	1,155.75	231.40	1,330.55	255
Aluminum	89.60	507.14	91.00	515.06	93.40	528.64	95
Pioneer Valley							
Newspaper	324.50	1,460.25	333.00	1,498.50	331.50	1,491.75	345
Glass	411.70	5,146.25	403.80	5,047.50	352.40	4,405.00	442
Plastics	143.00	822.25	145.70	837.78	129.30	743.48	133
Aluminum	87.00	492.42	73.40	415.44	78.00	[illegible]	78
Metro							
Newspaper	678.40	3,052.80	688.00	3,096.00	675.50	3,039.75	702
Glass	934.80	11,685.00	988.40	12,355.00	1,008.90	12,611.25	1,072
Plastics	324.00	1,863.00	329.60	1,895.20	321.50	1,848.63	354
Aluminum	166.60	942.96	173.00	979.18	155.40	879.56	167

This view was made from the same data you see to your left. All we did was drag the "Quarter," "Material" and "Region" tiles to new positions in the spreadsheet.



	Newspaper		Glass		Plastics	
	Tons	*Dollar Value*	*Tons*	*Dollar Value*	*Tons*	*Dollar Value*
Q1						
Seacoast	431.80	1,943.10	437.80	5,472.50	211.70	1,217.28
Pioneer Valley	324.50	1,460.25	411.70	5,146.25	143.00	822.25
Metro	678.40	3,052.80	934.80	11,685.00	324.00	1,863.00
Q2						
Seacoast	444.60	2,000.70	429.50	5,368.75	201.00	1,155.75
Pioneer Valley	333.00	1,498.50	403.80	5,047.50	145.70	837.78
Metro	688.00	3,096.00	988.40	12,355.00	329.60	1,895.20
Q3						
Seacoast	450.30	2,026.35	459.70	5,746.25	231.40	1,330.55
Pioneer Valley	331.50	1,491.75	352.40	4,405.00	129.30	743.48
Metro	675.50	3,039.75	1,008.90	12,611.25	321.50	1,848.63
Q4						
Seacoast	475.30	2,138.85	542.60	6,782.50	255.60	1,469.70
Pioneer Valley	345.60	1,555.20	442.20	5,527.50	133.00	764.75
Metro	702.00	3,159.00	1,072.50	13,406.25	354.00	2,035.50

Or look at it another way. With Improv, when you've made one spreadsheet, you've made them all.



Ashton-Tate breaks new ground in the NeXT world with PowerStep: a program based on the conventional spreadsheet model. It offers three-dimensional presentation-quality graphics, voice annotation and the "icon bar," which lets users create icons and assign them to time-saving macros.

It also becomes much less likely that your spreadsheet will contain costly hidden errors.

Consider this revolutionary if you wish. But it's only the warm-up to the real quantum leap.

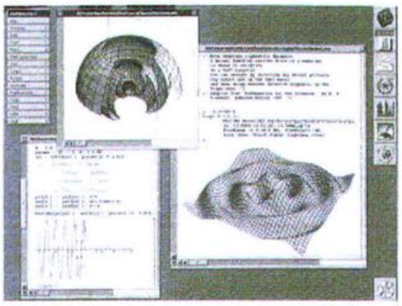
Unlike any spreadsheet you've ever dreamed of (unless you happen to work for Lotus), Improv allows you to move your column and row headings from one part of the spreadsheet to another, even interchange them – and without the slightest hesitation, the spreadsheet will automatically rearrange itself.

All you do is use the mouse to click one of the category "tiles" located along the edges of the spreadsheet – such as "Region" or "Material" – and drag it to a new location.

In this way, you get completely different views of your work and reach new conclusions – all with a single set of data.

Improv was born with other talents as well. It can turn your spreadsheet data into sparkling presentation graphics. It can also read files that have been created with Lotus 1-2-3 and write its own files in 1-2-3 format, so you can easily share data with people working on other platforms.

As the development team at Lotus will happily confirm,



Mathematica® is included with NeXT computers purchased for higher education. Many programs can summon its talent when they need extra computational firepower.

breaking new ground in software is many times easier in the NeXT world. (We'll get more into that a few pages from now.) And they're not the only ones who have noticed.

Ashton-Tate has now released PowerStep,™ which adds new dimensions to the conventional spreadsheet model, such as voice annotation and a much broader use of icons.

Some of the industry's most respected names in analytic and database software, Oracle® and SAS, have also developed programs for NeXT computers.

But rest assured, there's much more to come.

Starting on the next page.

PUBLISHING FINDS AN ENVIRONMENT IT CAN THRIVE IN.

When we started our company, we had the luxury of being able to stand back and take a fresh look at desktop publishing – an application that didn't even exist when most computers were designed. So ours could be the first machine literally born to publish.

The goal was to do away with the compromises and limits inherent in existing systems. And to create a platform that would allow software companies to create programs that are more sophisticated, and even easier to use.

We also wanted to be compatible with the industry as it now exists, so you can use your current output devices and the files you've already created.

Since the PostScript® imaging language is the one standard the industry agrees on, we built it into every NeXT computer. And not just for printing, but for on-screen imaging as well.

Having one imaging system throughout allows NeXT to fulfill what must be the most frequently broken promise in computer history: true "What You See Is What You Get."

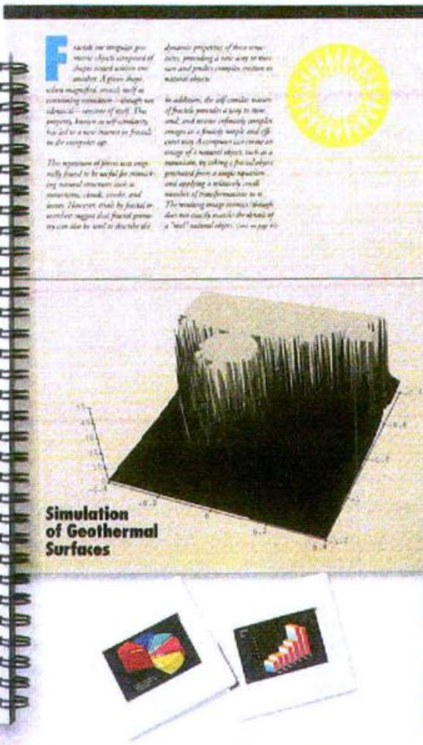
When you kern display type on the screen, what you get out of the printer doesn't come as a shock. Pages end where you expect them to. Measurements are more exact. (Think how many trees' worth of "test pages" this could save you in a year.)

And what you see can be breathtaking. With the combination of Display PostScript® and the ultra-high-resolution NeXT MegaPixel Display, screen images are always paper crisp. Type is sharp at any size or degree of rotation.

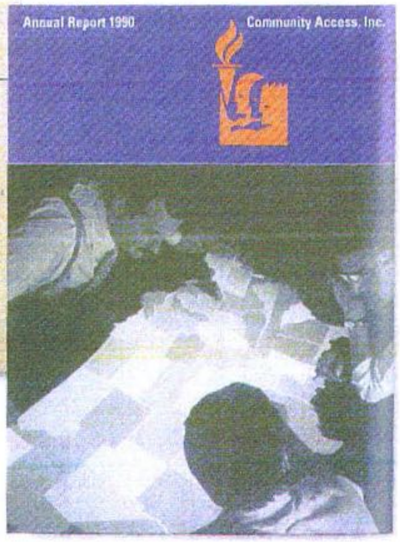
With true multitasking, NeXT computers let you run any number of applications

Statewide recycling program begins with the paper flow
Dollars Saved by Recycling

Frame *FrameMaker® is a comprehensive publishing package that's appropriate whether you're producing a short memo or a greater metropolitan phone book. It contains all the tools you'll need for word processing (including advanced indexing capabilities), graphics and layout.*



WordPerfect *On the NeXTstation, the WordPerfect Corporation has succeeded in creating the industry's most advanced word processing package. The NeXT version of WordPerfect offers multiple columns, text wrapping and complete file compatibility with WordPerfect on other systems.*



TOPDRAW *TopDraw™ is one of the easiest programs you'll ever use, yet it's far more advanced than other drawing programs. It offers sophisticated drawing tools, along with extensive controls for type. It also allows you to drop in scanned images (TIFF format), then scale, crop, rotate and even mask them.*

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Community Access, Inc.

Draw™ is one of the easiest pro-
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The NeXT Laser Printer offers 400-dots-per-inch resolution, compared to the 300 dpi offered by most. At the same time, it offers the most revolutionary price ever placed on PostScript laser printing: $1795 (suggested retail price).

at the same time. But the advantages of that go far beyond mere cutting and pasting.

Applications can actually cooperate with each other–each contributing what it does best. Without ever leaving your layout, you can select a word and ask for a definition from Digital Webster.™ Your illustration program can make sure the layout is updated with the most recent version of the art.

Not only does NeXT technology allow programs to work together, it helps people work together. Writers, editors, illustrators and designers can each contribute their part and route documents electronically–using the capabilities built into every NeXT computer.

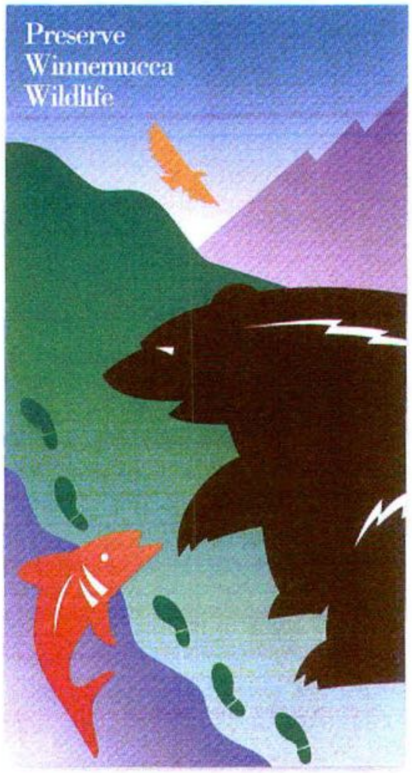
Never has a machine been so perfectly suited for the demands of publishing. And, as you can see below, the industry has been quick to respond. Some of the most popular names in publishing have already released software packages that fully exploit NeXT technology.

The more you learn about NeXT computers, the more you'll appreciate this fact:

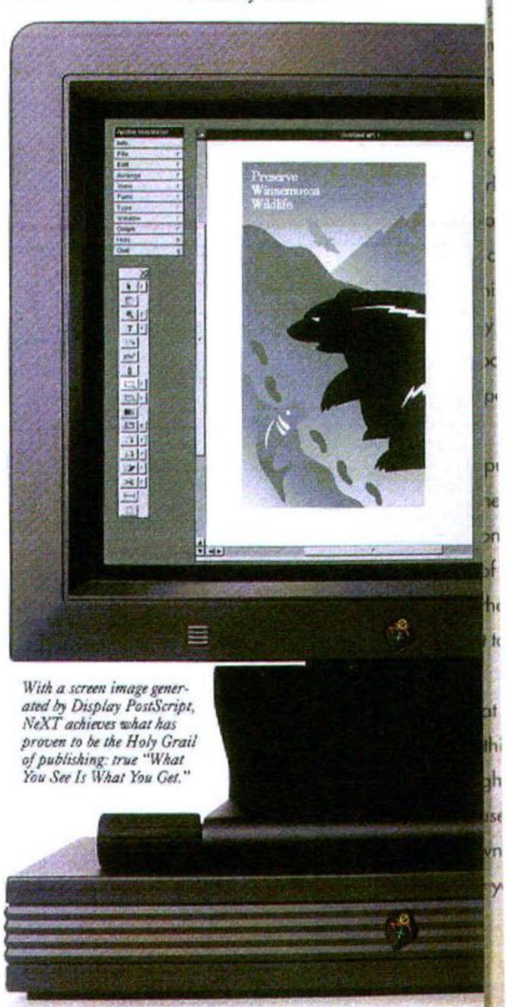
There's a tremendous difference between a computer that can simply handle publishing, and one that's virtually built for it.

AJK
ASSOCIATES

Adobe PostScript fonts give you professional results, on screen and paper. NeXT computers ship with 13 type styles, while the Adobe Plus Pack™ gives you access to 26 more. And coming soon: the entire Adobe Font Folio.™

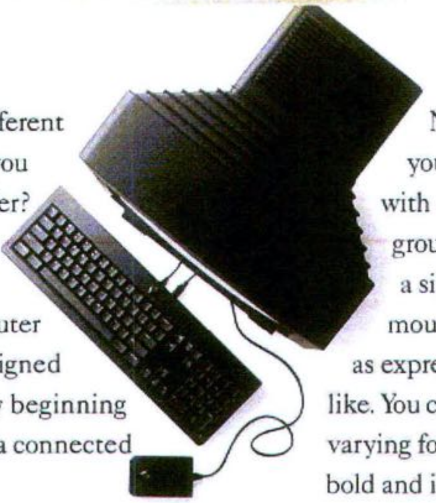


ADOBE *Adobe Illustrator® is perfect for designing pages with finely detailed illustrations. It lets you modify the shapes of fonts, even create your own typefaces. And, being a PostScript program in a PostScript world, it does many things – like zooming – with unprecedented speed.*



With a screen image generated by Display PostScript, NeXT achieves what has proven to be the Holy Grail of publishing: true "What You See Is What You Get."

PERSONAL COMPUTING BECOMES INTERPERSONAL COMPUTING.



The previous revolutions in personal computing – the spreadsheet and desktop publishing – were created with a single desk in mind. As were the computers built to support them.

But now we find we can accomplish more, and react more quickly, when people work together. And so, the revolution of the 90s:

Interpersonal computing.

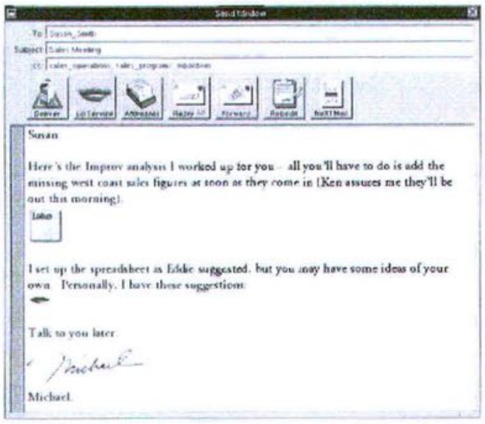
It's a new way of working that can dramatically enhance the capabilities of an entire department, an entire company or an entire university, enabling people to tap each other's strengths to meet new challenges.

Unfortunately, connecting machines is no guarantee of connecting people. Which is why NeXT computers were designed specifically for the interpersonal world.

And just what makes our machines different from others you might consider?

For one thing, every NeXT computer has been designed from the very beginning to be part of a connected workplace.

All the hardware you need to tie into a high-performance Ethernet network is built in.



To: Susan_Smith
Subject: Sales Meeting

Susan

Here's the Improv analysis I worked up for you – all you'll have to do is add the missing west coast sales figures as soon as they come in (Ken assures me they'll be out this morning).

I set up the spreadsheet as Eddie suggested, but you may have some ideas of your own. Personally, I have these suggestions:

Talk to you later

Michael

Michael

NeXTmail is a far cry from boring terminal-type e-mail. You can choose any size or style font for your text. You can also add graphics, attach documents (or folders of documents), even include voice memos.

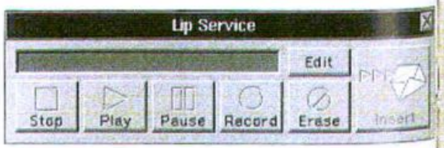
Second, ours are true multitasking machines, so communications can be spontaneous, no matter what application you're currently working with.

Third, all NeXT computers come with NeXTmail,™ easily the most sophisticated form of electronic mail available on any computer today.

NeXTmail lets you communicate with one person, or a group of people, with a single click of the mouse – and do so as expressively as you like. You can send text in varying fonts and sizes, bold and italics. Include graphics or scanned images. Attach entire documents (of unlimited length). You can even include voice messages using the microphone built into the MegaPixel Display.

And, despite its level of sophistication, NeXTmail is so intuitive, most people won't ever open the manual.

Now imagine a company arranged by department, each using a number of NeXTstation computers and



NeXT computers make it possible to punctuate a message with your own voice. Just call up Lip Service.™ It works like a simple tape recorder, so all you have to do is click "record" and start talking – the microphone is built into the NeXT MegaPixel Display.

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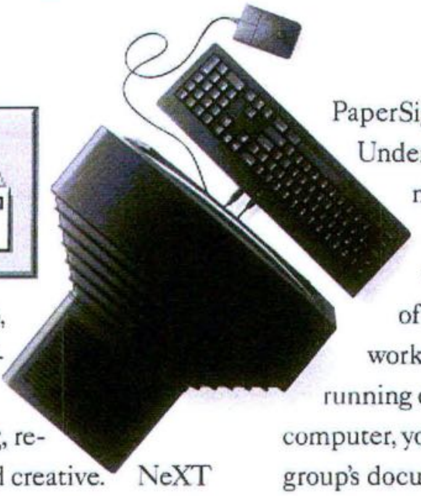


the NeXTcube™ computer as a server. By linking the departments, any one person in the company can interact with another – whether the two are in the same workgroup or on different continents.

In fact, when remote locations are tied together via NeXTmail, differences in time zones become almost meaningless in the scope of a project. NeXTmail can be delivered virtually instantly, even if a person isn't there to receive it.

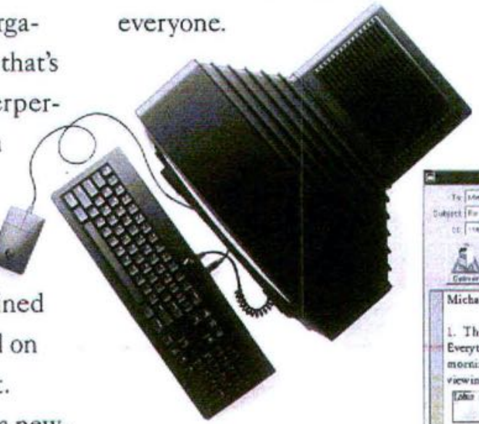
With a fax modem, your NeXT computer can send a document directly from the screen to any fax machine on earth – where it can be replicated at a remarkable 200-dots-per-inch quality.

Now the company is organized electronically, and that's the real revolution of interpersonal computing. When a sudden challenge arises, you can put together a special team to meet it – without being constrained by a rigid structure based on org charts or office layout.

Consider, for example, a new-product rollout. With every desk connected electronically, you can handpick the best people for the job, from engineering, marketing, research and creative. NeXT computers negate the physical distance between people, so everyone can stay up to date on issues, share new ideas and cut down on needless meetings.

But interpersonal computing is much more than NeXTmail.

Software like Who's Calling?,™ from Adamation, can provide a central system for tracking clients. Records that are used by many people in the office can all be stored in a single NeXTcube, so the most current information is available to everyone.



We wrote the documentation for NeXTmail knowing that few people would ever have to read it. NeXTmail is as intuitive as it is sophisticated. And, thanks to true multi-tasking, it's never more than a click away.

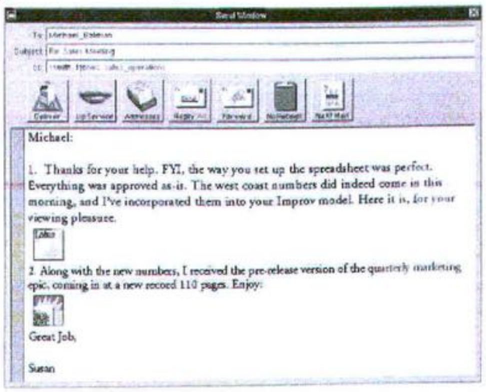
PaperSight,™ from Visual Understanding Systems, makes it easy to maintain a "group memory" – a history of each department's work. With this software running on the NeXTcube computer, you can store the group's documents centrally, cutting down on paper files and making it vastly easier to locate previous work.

We should also point out that NeXT interpersonal computing makes a cost-effective solution for any size workgroup.

Using the NeXTcube as a server eliminates the need to put costly storage devices on individual desktops. And NeXTstation computers don't require any additional investment in networking hardware.

Interpersonal computing can make a fundamental change in the way an organization works.

All you need is a computer that's up to the task.



Michael:

1. Thanks for your help. FYI, the way you set up the spreadsheet was perfect. Everything was approved as-is. The west coast numbers did indeed come in this morning, and I've incorporated them into your Improv model. Here it is, for your viewing pleasure.

2. Along with the new numbers, I received the pre-release version of the quarterly marketing epic, coming in at a new record 110 pages. Enjoy:

Great Job,

Susan

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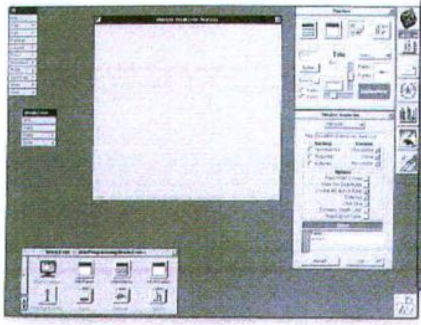
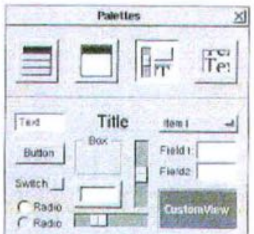
to display properly on either the grayscale MegaPixel Display or the new color

Earlier in this brochure, we showed you some remarkable NeXT applications from the



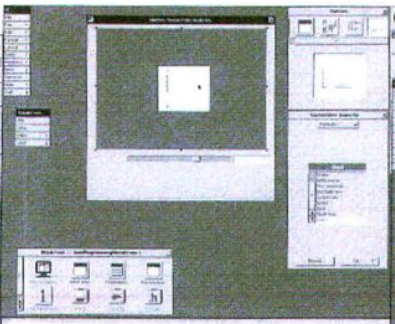
1 *NeXTstep gives you access to the power of UNIX, but spares you its complexities. Start with Interface Builder, which makes short work of what used to be the most time-consuming task: constructing an elegant user interface.*

most popular names in business software, including Lotus,® Ashton-Tate,® WordPerfect® and Adobe.®



Now, if it seems like the applications appearing on NeXT computer systems are more sophisticated than the ones you're currently using, and at the same time easier to use, you've already grasped the essence of one of our biggest breakthroughs: NeXTstep.®

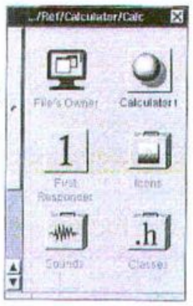
On one level, NeXTstep is the user interface that makes all NeXT computers so very intuitive and visually interesting. On another, it's a development environment that revolutionizes the way software is conceived and created. In fact, it's the entire reason why the



2 *Choose from a palette of interface objects in the Application Kit, like buttons, sliders and menus. Now you can resize and reshape objects, and link those that relate to each other.*

companies we just mentioned could create such extraordinary software in a fraction of the time it would have taken with other computer systems.

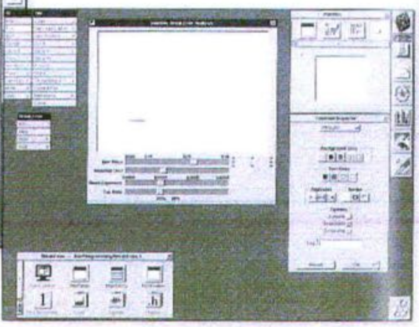
But even more revolutionary is the fact that NeXTstep is just as accessible to you.



So, for example, if you're creating customized software for people who take care of personnel, customer service or payroll, you can use the same tools Lotus used to create Improv, and WordPerfect used to create the NeXT version of their WordPerfect software.

The NeXTstep environment is an object-oriented world. It's purely graphical, making UNIX® easier to work with than DOS, OS/2,® Macintosh® or Windows™ environments. And it runs on every NeXT computer.*

One of the most extraordinary parts of NeXTstep is



3 *Arrange the interface so it looks exactly as you want the finished application to look. Even if you're a non-programmer, at this point you've successfully "prototyped" an application you can give to a professional.*

Interface Builder,™ which lets you create an elegant application interface using little more than the mouse.

You can choose from a palette of interface objects (such as menus, buttons and sliders) provided by the Application Kit.™ Then edit, link and arrange them the way you want them to appear in your finished application.

In addition, you can easily build new palettes of objects that

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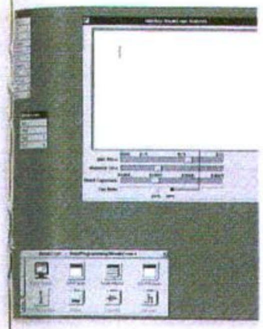

4 *Now, using the mouse, link*
graphically – so a user's ac
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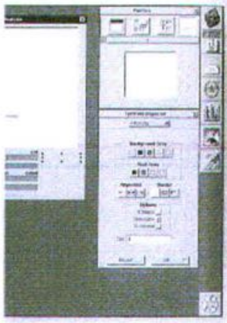

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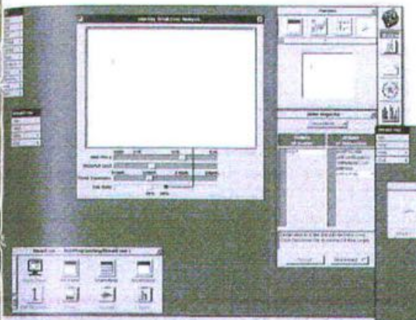
CUSTOM SOFTWARE IS CREATED IN A FRACTION OF THE TIME.

you design yourself. Or add your own customized objects to the NeXT Application Kit.

So with Interface Builder, you can rapidly generate a graphical front-end to a corporate database. You can also do some fast prototyping of new applications – which makes it that much easier to test your software with the people who will ultimately use it.



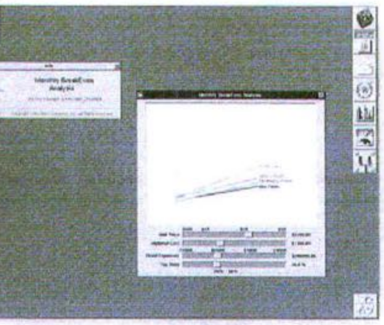
4 *Now, using the mouse, link your objects graphically – so a user's action on one can trigger a response in another. You can even create links to your own custom objects – such as a customer database or employee records.*

And the interface you create, which may have taken 90% of your time previously, now takes less than 5% – a streamlining that could put a serious dent in your backlog of projects.

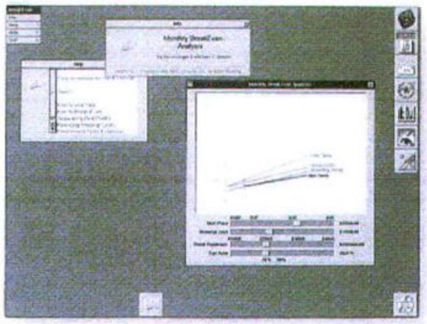
Most important, the programs you create are much more than simple information managers. They're real, industrial-strength applications – every bit as fast as the applications you buy off the shelf, and every bit as complete.

Applications you develop with NeXTstep are modular, too, so you can reuse portions whenever you see fit. And they're extremely easy to maintain. Now, when you update, there's no need to rewrite your whole application – you simply update the parts you want to change.

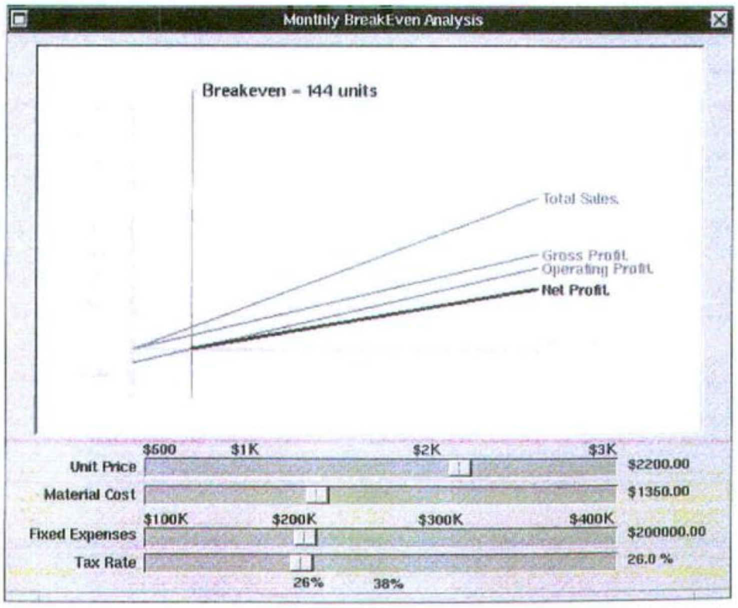
In the words of the NeXT Development Team at Lotus, "NeXTstep is the best development environment available on any personal computer today." There has really never been an environment anything like NeXTstep. And no machine is built to support it like a NeXT computer.



5 *When you have everything the way you want it, throw the testing switch and Interface Builder will let you run your interface through its paces.*



6 *Congratulations. You've just completed your interface in record time. Perhaps now your backlog of requests will look less intimidating.*



Unit Price $2200.00
Material Cost $1350.00
Fixed Expenses $200000.00
Tax Rate 26.0 %

With NeXTstep, you can create a real, industrial-strength application in a fraction of the time it would take in other environments – using the same tools the major software companies use to create their NeXT applications.

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* The NeXTstep development environment is included with the NeXTcube, and is available for the asking with the NeXTstation.

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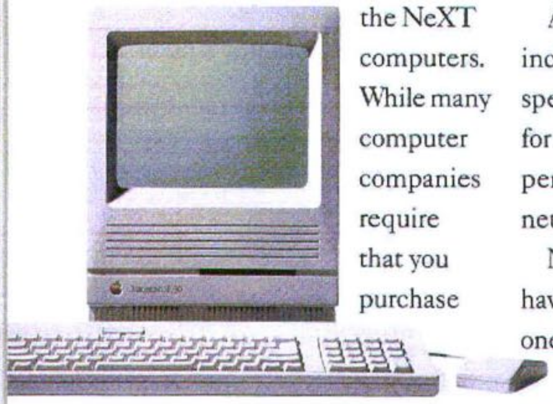
OUR WORLD CONNECTS TO YOUR WORLD.

Back in the old days (the 80s), people were willing to forgive the computer unable to venture beyond its own desktop. But in the era of interpersonal computing, connectivity is absolutely mandatory.

Rest assured, we were mindful of that fact when we designed the NeXT computers. While many computer companies require that you purchase an expensive network card for every machine you want to tie together, everything you need to connect NeXT computers is built right in. (You're on your own for the cable.)



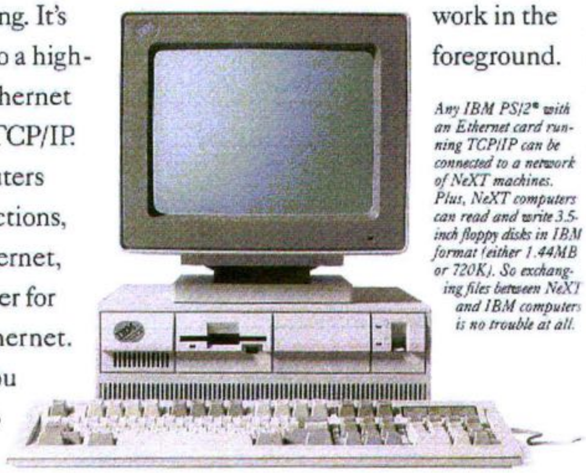
GatorBox® from Cayman Systems, lets you connect a NeXT network to a Macintosh network. GatorShare™ software lets you share data between the two, or use the NeXTcube to store files and applications for both networks. GatorMail™ lets you send e-mail between networks – NeXT machines using NeXTmail, and Macintosh computers using CE Software's QuickMail® or Microsoft® Mail.

And the equipment we've included isn't merely for low-speed networking. It's for connecting to a high-performance Ethernet network using TCP/IP.

NeXT computers have two connections, one for thin Ethernet, and the other for twisted-pair Ethernet. So whichever you use, there are no hidden costs.

Even our system software has been optimized to perform in a connected workplace.

NeXT technology is based on UNIX, widely acknowledged as the best system for networking. It's also optimized for multitasking, so your NeXT computer can attend to networking matters in the background while you do real work in the foreground.



Any IBM PS/2® with an Ethernet card running TCP/IP can be connected to a network of NeXT machines. Plus, NeXT computers can read and write 3.5-inch floppy disks in IBM format (either 1.44MB or 720K). So exchanging files between NeXT and IBM computers is no trouble at all.

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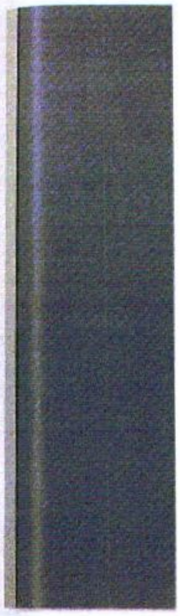

NeXT computers connect to
Ethernet using TCP/IP and
Or you can connect directly
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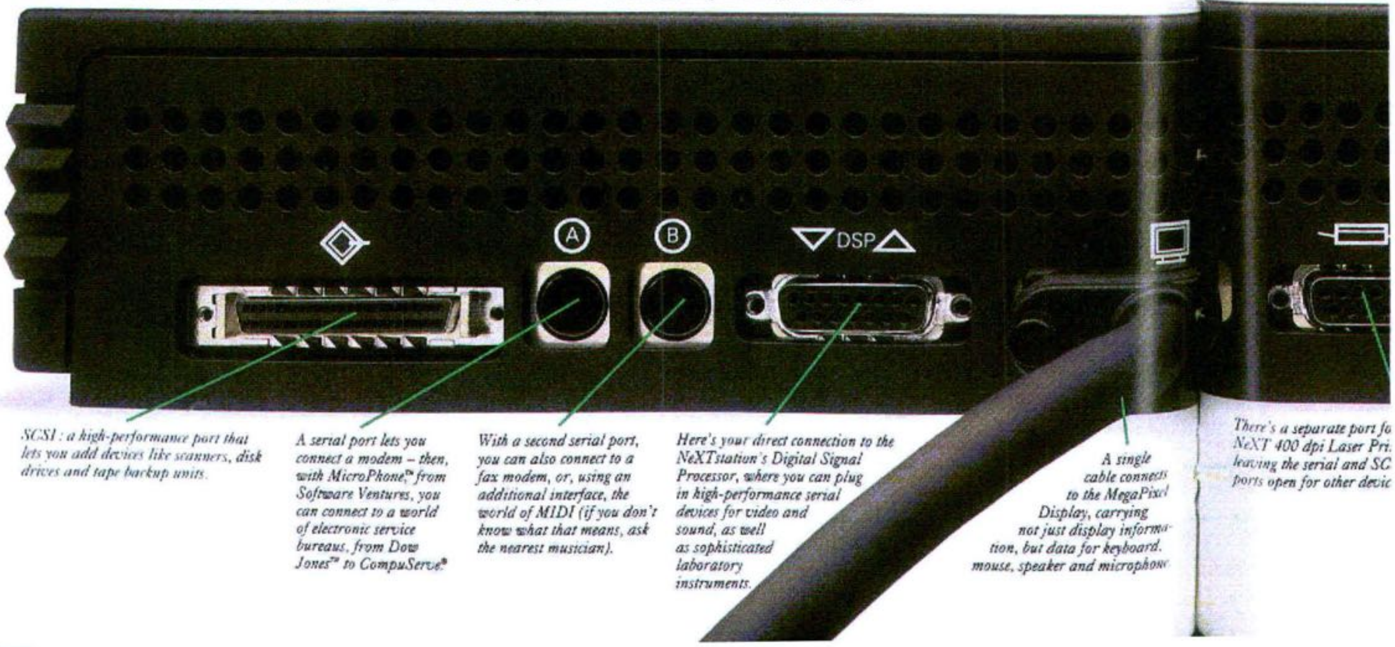
or 3270Vision. Communica
lets you connect to DEC ma
ing DEC VT220™ terminal

This is the NeXTstation - actual size. It's only two-and-a-half inches tall, but in performance overshadows computers many times bigger.



SCSI: a high-performance port that lets you add devices like scanners, disk drives and tape backup units.

A serial port lets you connect a modem – then, with MicroPhone™ from Software Ventures, you can connect to a world of electronic service bureaus, from Dow Jones™ to CompuServe®

With a second serial port, you can also connect to a fax modem, or, using an additional interface, the world of MIDI (if you don't know what that means, ask the nearest musician).

Here's your direct connection to the NeXTstation's Digital Signal Processor, where you can plug in high-performance serial devices for video and sound, as well as sophisticated laboratory instruments.

A single cable connects to the MegaPixel Display, carrying not just display information, but data for keyboard, mouse, speaker and microphone

There's a separate port fo
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leaving the serial and SC
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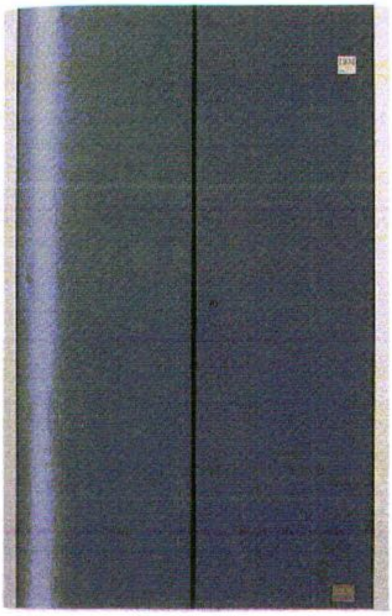
Any IBM PS/2® with an Ethernet card running TCP/IP can be connected to a network of NeXT machines. Plus, NeXT computers can read and write 3.5-inch floppy disks in IBM format (either 1.44MB or 720K). So exchanging files between NeXT and IBM computers is no trouble at all.

If that work should require IBM® PC file compatibility, so be it. NeXT computers can read and write floppy disks in DOS and OS/2 formats (1.44MB or 720K), so you can take a data disk created on one of your IBM machines and place it directly into your NeXT computer. Or vice versa.



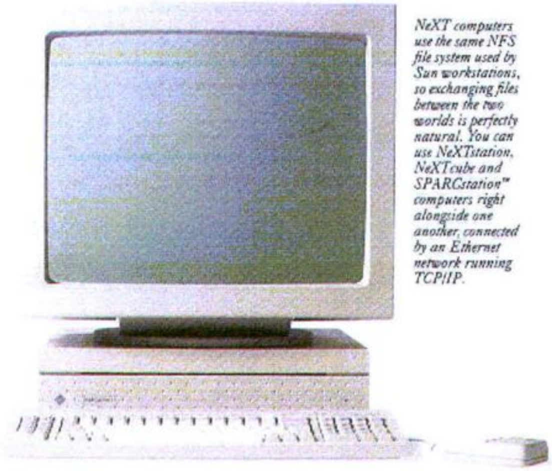
NeXT computers connect to IBM 3270 mainframes via Ethernet using TCP/IP and 3270Vision™ from Conextions. Or you can connect directly through a 3270 coax connection via the SCSI port with InSession3270™ from Avatar or 3270Vision. Communicae,™ from Active Ingredients, lets you connect to DEC mainframes via Ethernet by offering DEC VT220™ terminal emulation.

As for file compatibility on a network, NeXT computers observe the NFS® (Network File System) standard.

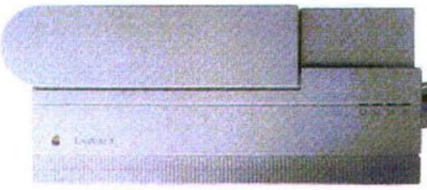
In fact, our machines can connect without problems via network to whatever technology you currently employ – from IBM PCs/compatibles, Sun® and Macintosh computers to IBM and DEC® mainframes.

So no matter how your office is set up today, or what technology you already have in place, NeXT computers won't just fit in.

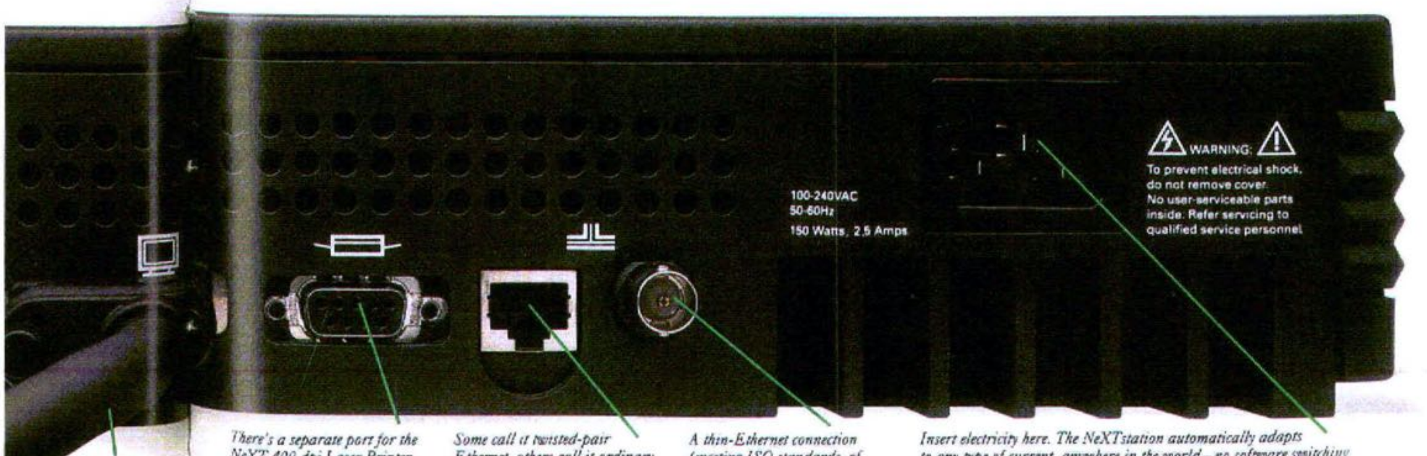
They'll stand out.



NeXT computers use the same NFS file system used by Sun workstations, so exchanging files between the two worlds is perfectly natural. You can use NeXTstation, NeXTcube and SPARCstation™ computers right alongside one another, connected by an Ethernet network running TCP/IP.



As a pure PostScript machine, a NeXT computer can connect to a world of output devices beyond the NeXT 400 dpi Laser Printer. You can also connect to an Apple LaserWriter® through a serial port, or to professional typesetting machines (such as the Linotype L100, L300 and L330) via the Ethernet or RS423 port. All PostScript output devices are fair game, from slide makers to QMS® color printers.


100-240VAC
50-60Hz
150 Watts, 2.5 Amps
WARNING
To prevent electrical shock, do not remove cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

A single cable connects to the MegaPixel Display, carrying not just display informa- but data for keyboard, speaker and microphone.

There's a separate port for the NeXT 400 dpi Laser Printer, leaving the serial and SCSI ports open for other devices.

Some call it twisted-pair Ethernet, others call it ordinary phone wire. But here's where it plugs in. Since most new offices are pre-wired with extra phone lines, this connection can drastically cut the cost of networking. It's based on the standard called 10 BASE-T.

A thin-Ethernet connection (meeting ISO standards, of course) is also built in, so, for smaller networks, you can just run Ethernet cabling from one machine to the NeXT.

Insert electricity here. The NeXTstation automatically adapts to any type of current, anywhere in the world – no software switching or special hardware required.

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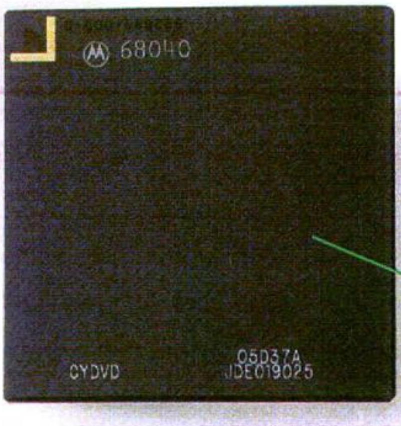
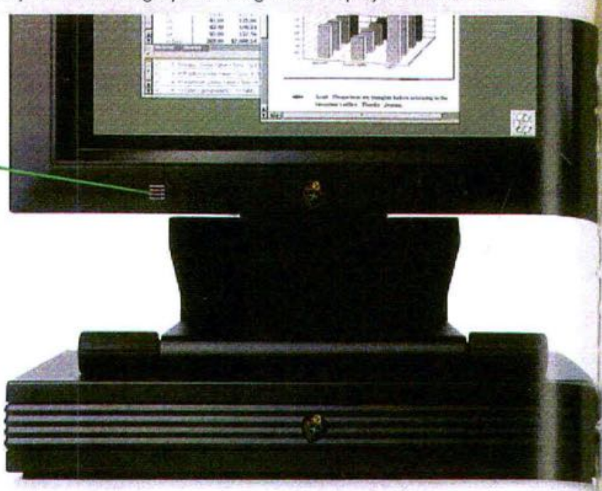


Motorola's newest microprocessor, the 68040 (040 for short), is the heart of the NeXTstation. At 15 MIPS, it combines the best technical features of CISC and RISC technology, all in one brutally powerful chip.

Sound is an integral part of the NeXT world. Which is why a microphone is an integral part of the NeXT MegaPixel Display.



The MegaPixel Display is standard, providing ultra-high resolution at 1120 x 832 pixels. Because Display PostScript generates the image, what you see here is exactly what will print

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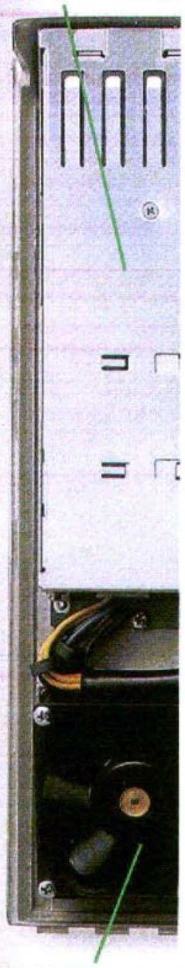

Yes, the NeXTstation has a f
if we didn't tell you. Thanks
design, all you hear is silenc

WHAT MAKES A NeXT COMPUTER A NeXT COMPUTER.

Delete
Power
Return
Shift
Alternate
Enter

You'll never search for another switch again. On a NeXT computer, you control everything from the keyboard, including system power, sound volume and display brightness.

The right mouse button can be enabled so when pressed, the current menu appears on screen wherever you happen to be. (A major boon on screens as big as ours.) If you're a lefty, mouse button functions can easily be reversed.

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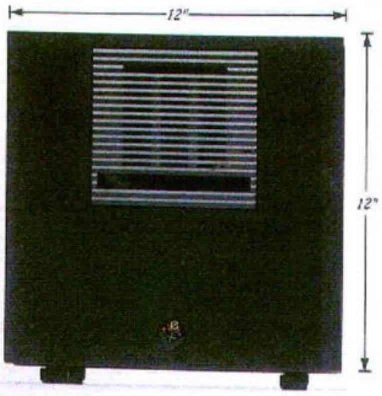
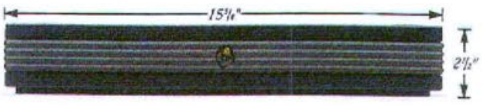
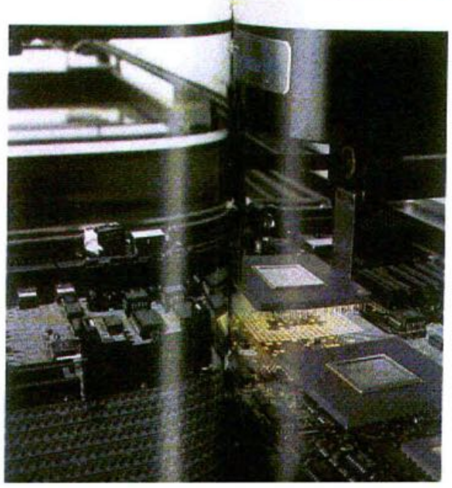
Only NeXT makes a Digital Signal Processor chip part of the basic computer architecture. This chip's ability to crunch huge arrays of numbers makes CD-quality sound possible. It also helps in compressing data and sound files so they can be more easily sent via NeXTmail.



Though significantly slimmer, the NeXTstation has the same computing power of the NeXTcube. But then, the NeXTcube has a few things to offer, too: like an optional optical drive that stores 256 megabytes on a single disk, up to 2.4 gigabytes of hard disk storage, up to 64 megabytes of RAM and three NeXTbus™ slots for worlds of new power.





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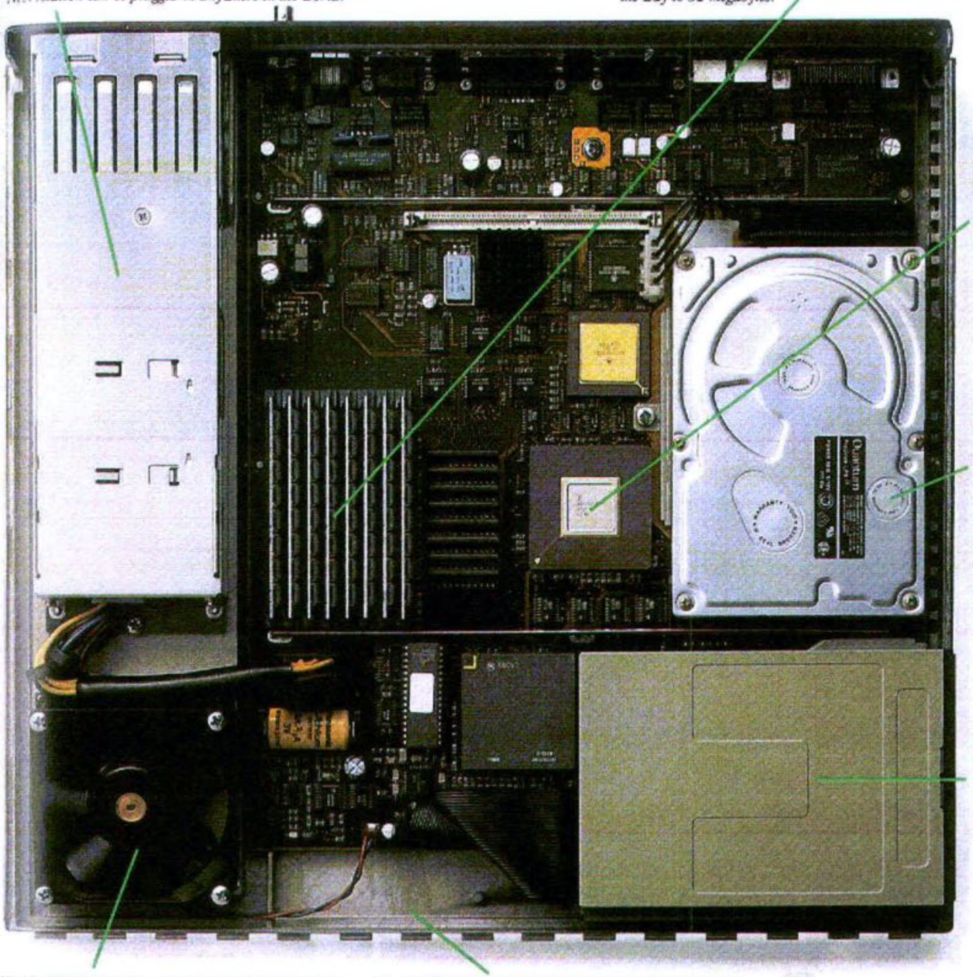
We don't expect Parallel Resonance Switching to become a household phrase. But it is a revolution as power supplies go – packing a great deal of power into a very small space. And it's completely self-adapting, so the NeXTstation can be plugged in anywhere in the world.

The NeXTstation starts out with a generous eight megabytes of RAM – more than enough for all but the most demanding uses. And it can be expanded all the way to 32 megabytes.



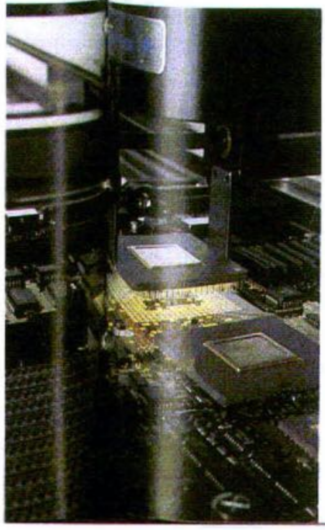
Small world. Using VLSI (Very Large Scale Integration) technology, our engineers have built nine separate input/output processors onto a single chip. So many important functions can be taken care of without distracting the main processor.

Don't worry about storage space. Standard in the NeXTstation is a 105-megabyte hard disk – onto which we've already installed an impressive bundle of software (including WriteNow®, Digital Webster, NeXTmail and all system software). But if you're a real glutton for storage, we also offer a 340-megabyte hard disk.

There's a floppy drive built into every NeXT computer. But in our world, a single 3.5-inch floppy disk can store a voluminous 2.88 megabytes of data – an industry first.

Yes, the NeXTstation has a fan, but you wouldn't know if we didn't tell you. Thanks to some innovative cooling design, all you hear is silence.

The NeXTstation's internal components are housed in lightweight, but incredibly strong magnesium. Which eliminates the need for heavy shielding inside, and provides ample strength to support large displays.



It takes an extraordinary factory to build an extraordinary computer. Untouched by human hands, NeXT machines are produced by an uncompromising team of robots in Fremont, California (supported, of course, by a terrific team of carbon-based units).

Thanks to the Digital Signal Processing chip (portrait elsewhere on this page), NeXT computers can produce digital stereo sound with the fidelity of a compact disc. The speaker is built into the MegaPixel Display, as are left and right output jacks for connecting to an external audio system, if you wish.

Our machines can read and write data not only in NeXT format, but in DOS and OS/2 formats as well (1.44MB and 720K). So, for example, moving data between Lotus Improv on a NeXT computer and Lotus 1-2-3 on an IBM machine can be perfectly painless.

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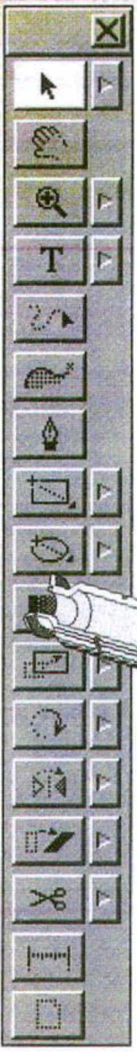


RIGHT NOW, YOU CAN GET TWO BREAKTHROUGHS FOR THE PRICE OF ONE: $4995.

In the NeXTstation, we have squeezed the most possible computer into the least possible space. We've also squeezed the most possible computer into the least possible price.

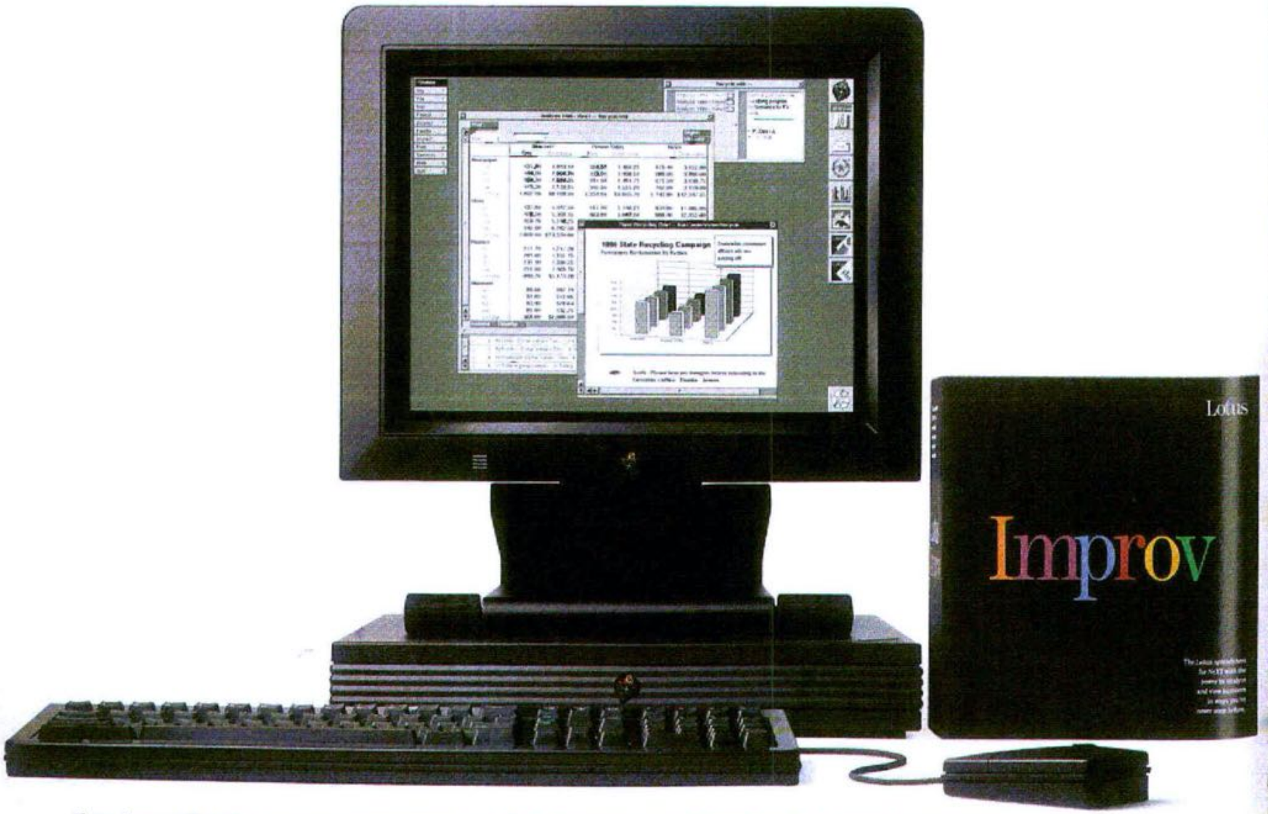
$4995 includes everything. Even those traditional computer "extras," like a keyboard and monitor.

Your NeXTstation comes equipped with eight megabytes of memory, a built-in 2.88-megabyte floppy drive and Ethernet. It also comes with a 105-megabyte hard disk, onto which we have taken the liberty of installing a formidable package of software, including WriteNow, NeXTmail and Digital Webster (and, if you happen to be in higher education, we've also included *Mathematica*). So all you have to do is plug it in and you're ready to go to work.

You even get a free trial subscription to NeXTWORLD™ magazine, to keep you up to date.

And just to make our case all the more compelling, we're going to send a free copy of the extraordinary spreadsheet program, Lotus Improv* (a $695 value), to everyone who purchases a NeXTstation or NeXTcube computer by 3/31/91. The same offer is being extended to current NeXT owners who opt for our 040 upgrade board.

We couldn't even guess where you could make a comparable purchase. Fortunately, we can tell you exactly where to make this one. Just call us at 1-800-848-NeXT.



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*Lotus Improv will be delivered when available to owners of all NeXT computers and 040 upgrade boards purchased and registered between now and March 31, 1991.

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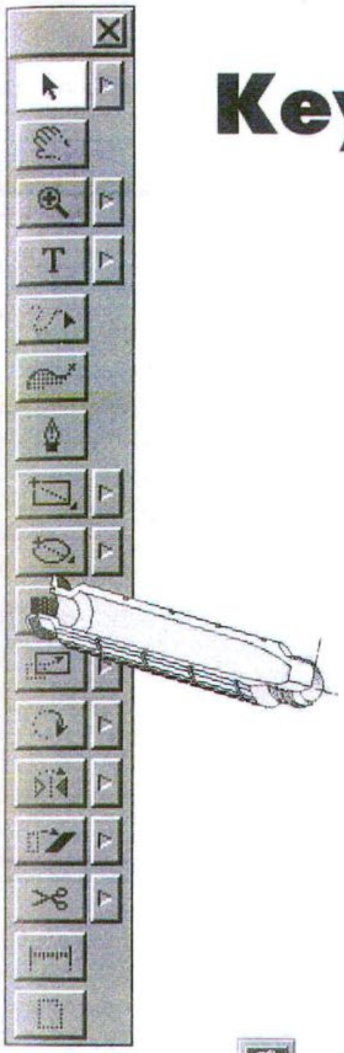


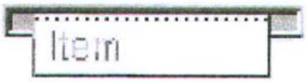
Key Software

NeXT's gourmet software menu now features meat-and-potatoes entrées to satisfy corporate appetites.

by Bruce F. Webster

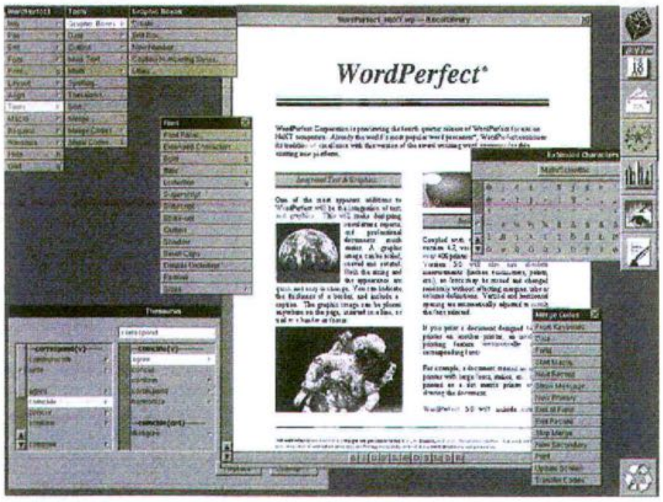
I'm convinced that if any firm introduced the world's fastest, cheapest personal computer—say, a desktop Cray for under $1000—one of the first questions would be, "Yes, but does it run Lotus 1-2-3?" It's an unavoidable question. Even at the leading edge of technology where NeXT's breakthrough user interface and vision of group productivity dwell, folks want what's familiar, safe, and standard. This doesn't do much to promote diversity or innovation, but it does keep corporate MIS types happy. As a result, machines get bought, and computing revolutions quietly transpire. Which explains why September's NeXT renaissance featured Lotus and WordPerfect CEOs Jim Manzi and Alan Ashton up on stage, instead of the concert violinist who played a duet with the computer at its debut in 1988. NeXT acknowledges—indeed, has never denied—that it needs mainstream applications to make corporate sales inroads.

Among the myriad software classifications, only three really matter: word processing, spreadsheets, and database management. To sell a workstation as a general-purpose office tool, you need competitive, compatible products in each of these categories; if you don't have them, you're dead. You can and should have others—communications, software development, graphics, and so on—but those alone cannot carry a system, as was demonstrated by the torpid sales that dogged NeXT's first year and a half. In this article we'll look at how well NeXT software satisfies business needs in every category, and particularly in the big three.



Word processing. The preferred phrase may be "desktop publishing" (DTP) or, if you're really hip, "workgroup publishing," but what businesses need is old-fashioned word processing. You know, putting lots of words onto lots of sheets of paper, with a little dressing up along the way—a column of text here, a graphic there, maybe a different font or two. And NeXT ads and the *Seybold Report* notwithstanding, the NeXT's choices for word processing (not to mention DTP) have been limited and nonstandard.

NeXT comes with WriteNow, an entry-level word processor that more or less gets the job done, but that most users will drop as soon as something better comes along. The only other option has been FrameMaker 2.0, a high-end DTP system that, though quite powerful, suffers from a less-than-limpid user interface. You don't have to be a rocket scientist to figure out on your own how to use FrameMaker, but it sure doesn't hurt. Between it and WriteNow yawns a barren wasteland, product-wise.



WordPerfect
The NeXT version of WordPerfect provides all the features that made the DOS version a success, plus lightning speed and a graphical interface. NeXTy details like the thesaurus screen shown here, where related words are organized in a Browser-like hierarchy, give this version extra cachet.

WordPerfect Corporation has leapt in to fill that void with WordPerfect for the NeXT. The company hopes WordPerfect will be to the NeXT what it is to DOS computing—the dominant word processor—only more so. On the PC, WordPerfect has achieved only a 70 percent market share; on the NeXT, it'll probably garner 90 percent. Why? Well, first, because it's there before everyone else. Beyond that, the product appears to be fast, clean, and complete. NeXT owners used to slogging through WriteNow on an '030 machine stared open-mouthed at the near-instantaneous page reformats during the WordPerfect demos. Part of the velocity was due to the '040 CPU, but great coding by WordPerfect's NeXT development team undoubtedly helped.

Once they get a look at the NeXT version, even the most fanatical DOS WordPerfect evangelists will be green with envy. Unlike with the text-based DOS versions, NeXT WordPerfect users actually see what their document looks like at all times (an upcoming version of WordPerfect for Windows 3.0 will likewise provide a WYSIWYG interface), and they don't need any function key templates. NeXT and WordPerfect have made it easy to jump ship, too: The new NeXT systems read and write DOS-formatted 3.5-inch disks, and NeXT WordPerfect reads and writes DOS WordPerfect documents with no trouble at all, according to WordPerfect. Training should be a snap; despite recent revisionist studies decrying the alleged mental erosion caused by windows, icons, and mice, novices really do respond to graphical user interfaces more readily. Best of all, WordPerfect should be shipping by the time you read this.

Desktop publishing products are in the works as well. As mentioned, FrameMaker is out there and does a good job. Quark, manufacturer of the preeminent Macintosh DTP application, has announced its intention to compete by releasing a NeXT version of QuarkXPress sometime in 1991. DTP is a key application, and NeXT, with its Display PostScript graphics, is particularly well suited to the task. But as Apple discovered in the mid-1980s, being the harbinger of a nifty new technology—like DTP—isn't enough to get revolutionary hardware in the door. For that, NeXT needed at least a WordPerfect. They got something more.

Spreadsheets. As with word processing, folks like to dress up this category a bit with fancy names like financial analysis, numerical modeling, strategic planning, decision support. Whatever they call it, though, they do it with spreadsheets: Microsoft Excel, Borland's Quattro Pro, or one of the many incarnations of Lotus 1-2-3. NeXT has actually had a spreadsheet for some time, Wingz, from Informix. But Informix managed to take an award-winning application, put it in an award-winning environment on an award-winning platform, and turn out a turkey, of sorts. It's not that Wingz for NeXT doesn't have a lot of functionality and power; it does. Unfortunately, it also has a user interface that represents a kind of trans-platform lowest common denominator, and a noteworthy sluggishness. Suffice it to say that Fortune 500 representatives were not lining up to buy the NeXT in order to run Wingz.

Now, however, NeXT enjoys an opulence of spreadsheet possibilities. (For a close evaluation of NeXT spreadsheets, see "Spreadsheets: The NeXT Generation" in this issue.) Ashton-Tate, the company that brought you dBase, has created PowerStep, a powerful product that has been overshadowed by all the attention focused on the more spectacular Lotus Improv. PowerStep has at its core a classic spreadsheet with a NeXT-compliant interface and great performance on the '030. It should really scream on the '040. It also offers broad graphical functionality and a powerful macro language. This combination gives PowerStep significant presentation capabilities. And it reads and writes Lotus 1-2-3 files.

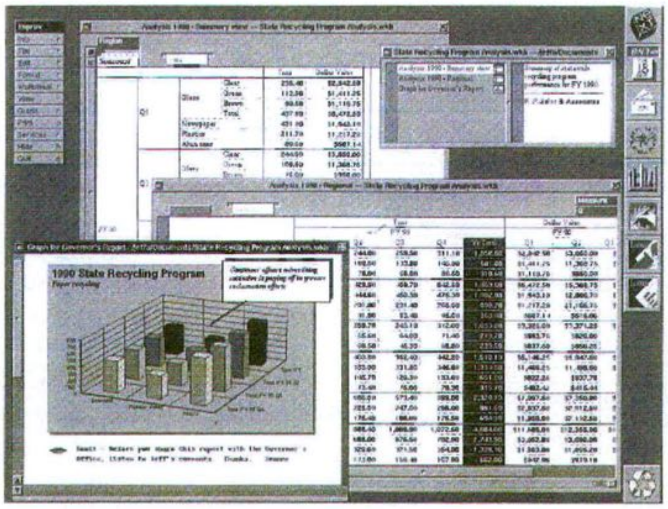
But Improv is getting the lion's share of attention, and rightfully so. Lotus explains that with Improv they set out to reinvent the spreadsheet. The result certainly gives them the right to brag. Column letters, row numbers, and cell formulas, the main source of frustration for spreadsheet users, are all gone. In their place are rows and columns labeled in plain English, and an independent list of formulas that use those labels, making Improv, in essence, a relational spreadsheet. For example, suppose you have rows labeled UNITS BOUGHT, UNITS SOLD, WHOLESALE PRICE, RETAIL PRICE, EXPENSES, GROSS SALES, and NET PROFITS. In the formula panel, you would enter the following formulas:

"EXPENSES = UNITS BOUGHT * WHOLESALE PRICE"
"RETAIL PRICE = 1.4 * WHOLESALE PRICE"
"GROSS SALES = UNITS SOLD * RETAIL PRICE"
"NET PROFIT = GROSS SALES – EXPENSES"

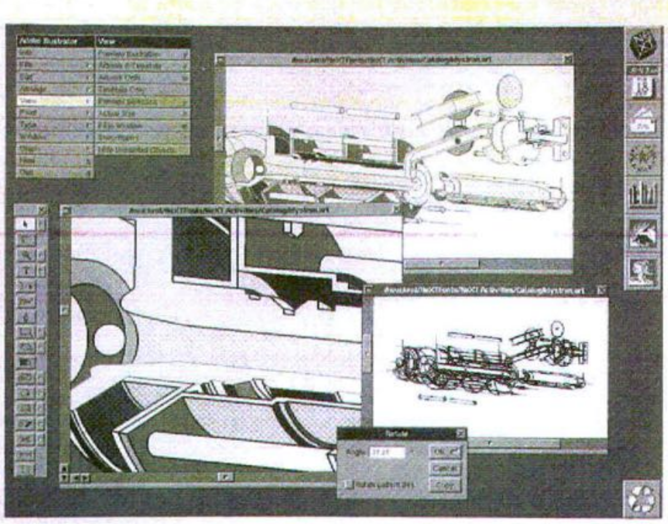
Now, no matter how those rows grow or shrink in size, and no matter where they appear in your spreadsheet, the appropriate calculations always take place. Other innovative features abound. You can easily rearrange a spreadsheet by moving around small tokens that represent row or column categories. You may open multiple windows to a spreadsheet, allowing you to view (and change) data in several different ways simultaneously. And, naturally, Improv will read and write Lotus 1-2-3 files directly—an ability tremendously attractive to the corporate market. And to sweeten the deal, NeXT bundled a copy of Improv with every NeXT system and upgrade sold by the end of 1990—a move that is great for NeXT, good for Lotus, and unfortunate for Ashton-Tate.

Databases. So, you ask, where's dBase IV for the NeXT? That's a good question. For all the commotion in other product categories, things have been awfully quiet in database management. Sure, Ingres, Oracle, and Sybase have all announced NeXT projects, but the screen shots in the Fall 1990 product catalog show terminal-like windows sitting in the middle of the NeXT screen. Even when these SQL-based products acquire NeXTstep-based front ends, they'll be better suited to the heavy-duty applications that get frequent attention from database specialists. But what about departmental or personal projects? Where are FileMaker, Clipper, FoxBase, Helix, and 4th Dimension?

It seems as though the NeXT, with its large display, graphical object orientation, and rich memory and mass-storage standards, would be a natural environment for a top-notch database. But if anyone is developing such a product, they're being very secretive about it. Such a situation may not be a big disadvantage at this stage; businesses that rely on database technology and already have large, established databases will be reluctant to move them to any other platform, including the NeXT. But in the long run the lack of stand-alone data-



Lotus Improv
Lotus's Improv supports several views of a single set of spreadsheet data. Users can cycle between views with the Model Browser, shown top right.



Adobe Illustrator

The NeXT version of Adobe Illustrator has all the features of the latest Macintosh version. The NeXT's Display PostScript imaging model provides precise on-screen renderings of illustrations.

base products could seriously hurt NeXT. In the meantime, recognizing the demand for custom database interfaces in large corporations, both NeXT and some third-party firms are developing ways to use the powerful NeXT development environment to create front-end applications. Professional Software has released the Objective DB Toolkit, a library of SQL interface objects for NeXT's Interface Builder. Sybase, for its part, is offering the NeXT Database Developer's System, which includes the five-user NeXT SQL Server (previously bundled with NeXT system software Release 1.0), and the Database Kit, an object library jointly developed by NeXT and Sybase.

There is at least one end-user database announced: DataPhile from Stone Design Corporation. This is a flat-file database system that should prove sufficient for most simple needs but is insufficient for business and corporate database requirements.

Graphics. Although not one of the big three categories, programs for creating graphic images—particularly vector-based draw programs—are a mainstay of more than one computer environment. NeXT, with its vector-based Display PostScript interface, would seem like a natural for drawing packages. Surprisingly, there hasn't been a flood of applications. But the products on the horizon look pretty good.

So far, Media Logic's TopDraw has pretty much had the NeXT draw market to itself. It offers a page-oriented, object-based drawing environment with a number of special effects. Adobe, in the meantime, has been preparing a version of Adobe Illustrator 3.0 for the NeXT, which should be out by the time you read this. The biggest difference between the NeXT version of Adobe Illustrator and those found on other platforms is that no special Preview mode is required, since the NeXT display is rendered using PostScript.

Supporting both drawing and word processing programs are a few collections of clip art (ClickArt from T/Maker and Klip It from Adamation), any number of fonts from Adobe and the Font Company, and two text manipulation packages: TextArt from Stone Design Corporation and TouchType from Right-Brain Software.

In a class by itself is Diagram! from Lighthouse Design (see the review in this issue). Billed as a "digital whiteboard," Diagram! lets you quickly lay out diagrams, flowcharts, and organizational charts. Items in a diagram can be linked to other diagrams, as well as to external documents and applications, causing them to be displayed or launched when the item is selected.

Interpersonal computing. NeXT agrees with John Donne that no man (or woman) is an island, and thus sees interpersonal computing as a key concept of the nineties. The idea is obvious, at least once it has been explained: People need better tools to coordinate and facilitate group work. What is less clear is how a third-party developer sets about creating applications that promote interpersonal computing. If you drag connectivity and communications under that blanket term, then you can discuss some existing and planned products. However, true groupware—applications specifically designed for multiple simultaneous users—remains more elusive. The new NeXT systems have a high degree of built-in connectivity. They read and write 3.5-inch DOS disks, and come with built-in Ethernet hardware, DataVizBridge software that allows Mac-to-NeXT transfers, and a couple of serial ports. NeXT's new NetManager software greatly simplifies setting up and administering a multi-NeXT network, and NeXT-mail facilitates multimedia communications from NeXT to NeXT, as well as plain vanilla e-mail transfers to and from other systems.

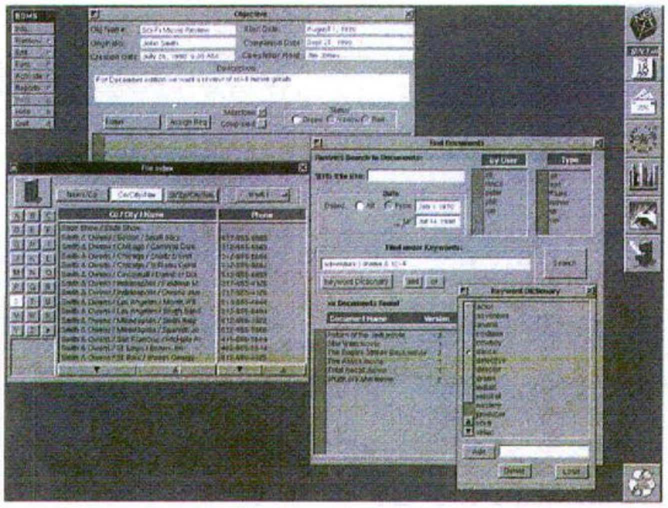
In addition to all this, several third-party products extend the NeXT's capabilities. Cayman Systems' GatorBox links the NeXT to an AppleShare (Macintosh) network through Ethernet; GatorShare software lets a NeXT system act as a file server for a Macintosh network. On the PC side, Novell has announced vague plans to support the NeXT, while Atlantix's Axcess software, which ties together UNIX, DOS, and minicomputer networks, represents a firmer commitment. Two firms, Avatar Corporation and Conextions, are offering that ubiquitous tool of mainframe connectivity, the 3270 terminal emulator. Communicae, a communications program with extensive DEC terminal emulation capabilities, has been out for a while but is less than overwhelming in interface design and functionality. Software Ventures Corporation has announced MicroPhone II for the NeXT, a product that promises to be powerful and easier to use, but which won't appear until early 1991.

The really interesting connectivity product is SoftPC 2.0 from Insignia Solutions. SoftPC 2.0 emulates a 80286-based system with an EGA display running DOS. SoftPC may let the NeXT qualify as a DOS system for organizations with such a requirement, where NeXT's direct support of DOS diskettes should help tremendously.

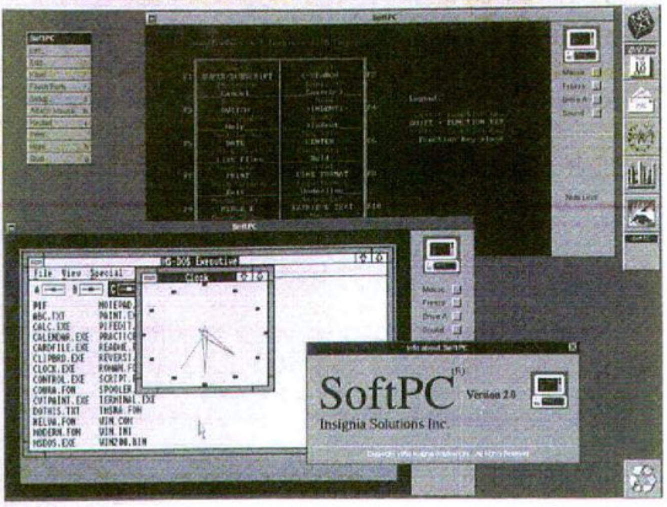
As for true groupware, well, there aren't many contenders, currently. The three most visible firms are Adamation, Boss Logic, and Visual Understanding Systems (VISUS), and they are linked by two common threads: contact lists and document management. Adamation is best known for Who's Calling?, the program that helped NeXT land one of its largest customers for the original Cube, the William Morris talent agency. Who's Calling? lets users create and update a contacts list over a network, automatically sharing information as it is entered. Boss Logic is offering Contact!, a product with much the same scope.

A more interesting Boss Logic application is the Boss Document Management System (BDMS), which will allow over-the-network searching, checking-out, and updating of documents of all types. Built into BDMS is a project management system that tracks the status of documents being created or revised. In contrast, VISUS's Professional PaperSight is geared more toward information storage and retrieval, with a special emphasis on scanning hard-copy documents, organizing and annotating them, and producing new copies (via printer or FAX machine) on demand. A stripped-down version, PaperSight, is available for those with fewer needs (and less money). Not surprisingly, VISUS also offers a line of scanners and FAX modems that supports the PaperSight applications.

More to come. Despite the frenzy of product announcements, NeXT covers only two out of three of the major bases when it comes to application areas. NeXT system buyers will find excellent solutions for their word processing and spreadsheet needs, and a growing number of graphics, connectivity, and specialized applications, but not much in the area of database management.



Boss Document Management System
The Boss Document Management System addresses the implications of NeXT networking. BDMS provides the structure for implementing organization-tailored systems to track documents shared by a workgroup.



SoftPC 2.0
Insignia Solutions' SoftPC gives the NeXT the ability to run DOS applications, an important boon for multiplatform offices.

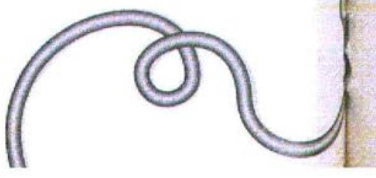
This weakness notwithstanding, NeXT has turned an important corner. Not only have several PC-to-NeXT barriers fallen, but at least one application—Improv—offers a compelling reason to buy a NeXT system over any other—something that has been lacking until now. This doesn't mean that NeXT is out of the woods, but the trees do seem to be thinning a bit.

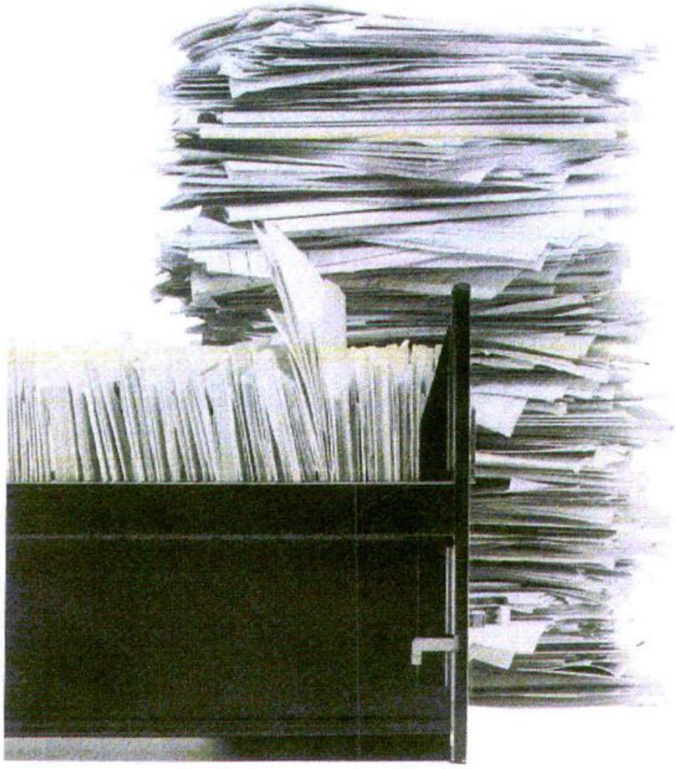
A whole new category of software specifically designed for NeXT-style computing is Services. Services are objects from larger applications or self-contained programs that can be called from the Services menu in any program written for NeXTstep Release 2.0. This interapplication communication—making important functions available no matter what application you're in—is a component of interpersonal computing that is as important as e-mail. Although as of this writing the only services available were from the bundled applications NeXTmail and Digital Librarian, it's a good guess that many more will soon spring up.

Most important, NeXT has dropped the barriers for software developers, with cheaper systems, much cheaper distribution media, and, they hope, a rapidly expanding installed base. Thirty-three developers showed products at the September 18 introduction of the new machines, and at press time 100 new products were expected by year's end. NeXT counts over 1000 registered developers. The growing number of developers, combined with the ease of programming the NeXT, could release a flood of software into the market in 1991, filling in more gaps and holes. The NeXT will then be left to stand or fall on its own merits, rather than on what software programs are or aren't around. By then, the corporate users may well look at the latest '486-based DOS computer and ask, "But does it run Improv?"

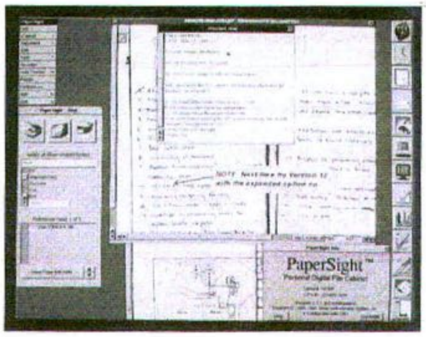
Bruce Webster *is author of* The NeXT Book *(Addison-Wesley, 1989).*

A list of third-party products available for the NeXT is included in Dock Soup in every issue of NeXTWORLD. *As the products mentioned in this article become available, you will find ordering information for them there.*





The NeXT™ Solution To The Paperless Office: PaperSight.™



Now there's a way to put the power of your NeXT machine into document image management.

PaperSight is a new environment to manage the flow of documents and information in your office. It is the first complete document image management system for the desktop.

It does all the right things. Using scanned data, your paper documents can be filed and then quickly retrieved, viewed and annotated. Or use OCR to convert files for other applications, including word processing and spreadsheets. All of the NeXT capabilities are available and enhanced by PaperSight including voice notes, interprocess communications, and fax input and output. The Visus FaxDaemon is on every NeXT you buy.

The software is modular and can be upgraded into departmental systems, just by adding more NeXT machines with PaperSight.

For more information on PaperSight, call 412-488-3600, FAX 412-488-3611, or write Visual Understanding Systems, Inc. 2100 Wharton Street, Suite 701, Pittsburgh, PA 15203.

VISUS

Circle 5 on reader service card

NeXTWORLD's Reviews Policy

Products are the crucial intermediary between the user and the task the user wants to accomplish. Great products are crucial to the success of the NeXT community. We review products both to provide information about current products and to help improve future ones.

Our reviews strive to answer the following three questions:

- What do products in this category attempt to do? This question frames the task the user needs to accomplish.
- What are the goals of this product according to its manufacturers, and how well does it accomplish those goals; that is, within its category, what specific problems does this product solve?
- Ideally, what might this product and category do? In other words, we judge the product also against an absolute concept of excellence rather than a relative one. In answering this question *NeXTWORLD* will serve as an advocate for change.

Our ratings will be based almost entirely on the first two criteria. The third will be used to suggest improvement and as a qualifier for our highest rating.

We will try to avoid grade inflation. Very few products will be awarded five cubes, and a good product will get three cubes, not four.

Our reviews will be independent, impartial, and fair. They will reflect the combined judgment of the reviewer and the editorial staff. Unlike opinion pieces, bylined reviews are backed by, and are the responsibility of, the editorial staff.

As always, we invite feedback. Write us, send e-mail, or phone.

Note:

In the first few issues, we will take the unusual step of reviewing and rating pre-release software. In our judgment our readers need to have information about these crucial products as early as possible. They were reviewed normally, but product ratings were not downgraded based on defects that the manufacturer has indicated will be corrected before shipping. Beta products reviewed here should reach market by the time the magazine appears.

The NeXTWORLD rating system

■■■■■
Best of Breed. Solves a user's problem in innovative ways. Meets the highest goals for the category.

■■■■
Excellent. Very good by today's standards, but we can envision better.

■■■
Good. Has some problems, but solves others.

■■
Fair. Merely adequate. Has some bugs.

■
Poor. We don't recommend it.

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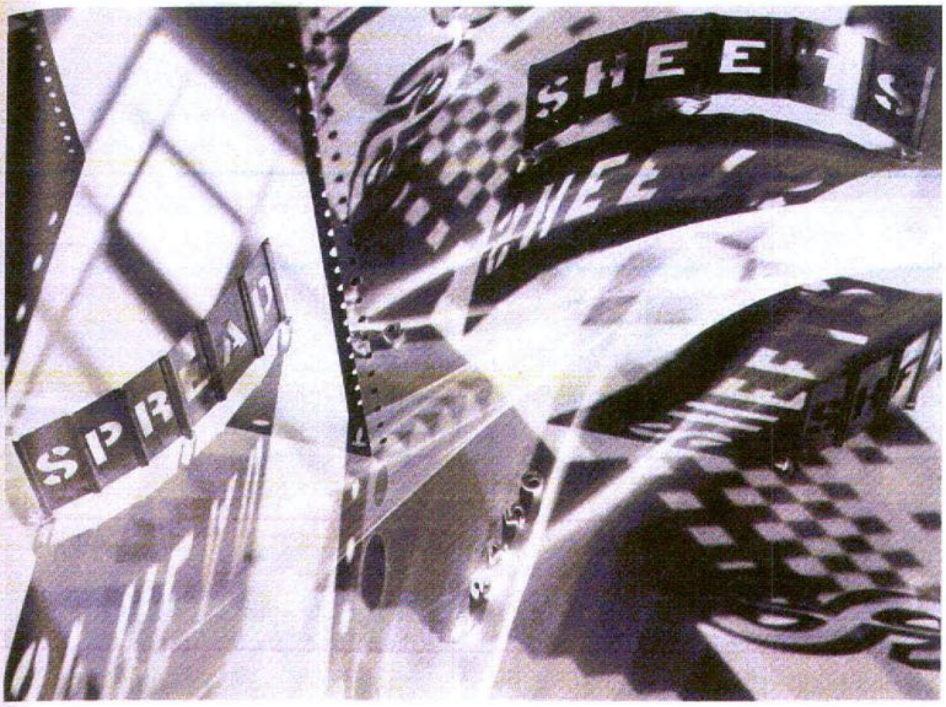


Spreadsheets: The NeXT Generation

The **three NeXT spreadsheets stake out their territories.**

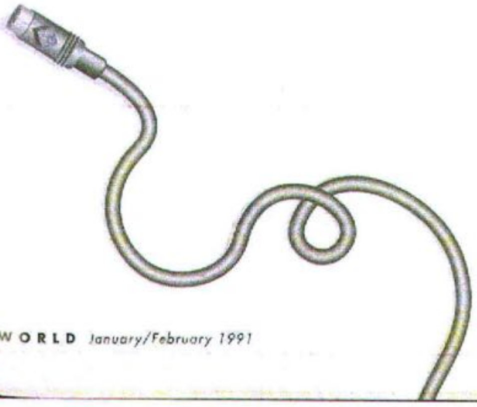
by **Robert Lauriston**

People don't buy computers just because they want to get their hands on a neat new gadget. (Actually, some of us do—but even we need to provide a more mature excuse to our boss or the IRS.) Unless you're a programmer, you buy a computer to help you communicate and manage information. The success of PCs and Macs stems from the wide variety of inexpensive, off-the-shelf word processors, database managers, graphics programs, and other productivity tools they offer.

For the NeXT to make its way out of the backwaters of academia and engineering and into the mainstream of the computer marketplace, it has to offer a similar choice of powerful tools. Although all kinds of applications are important, those most crucial to the NeXT's success are probably those that are most important to corporations—word processors and spreadsheets. (Fortune 500 companies account for over half of all computer software purchases.)

To see how the NeXT stacks up against its competition in the spreadsheet sweepstakes, we'll look at three programs. PowerStep is a somewhat Excel-like program from Ashton-Tate, whose spreadsheet resumé includes MultiMate and Framework on the PC and Full Impact on the Mac. This product is positioned as the basic spreadsheet for the average Joe. Informix's Wingz is almost identical to its Mac product, which has also been ported to PCs, Sun workstations, and other platforms. It's for those that need a basic product with additional capabilities in custom applications and graphics. Improv, from Lotus, is a radically different spreadsheet, whose various versions of 1-2-3 dominate the PC spreadsheet arena and are becoming dominant on a slew of other platforms. Their product is for the user seeking a basic spreadsheet plus powerful modeling and analysis.

Spreadsheet evolution. To understand where these programs fit into the spreadsheet universe, let's turn the clock back a few years, to the first electronic spreadsheets. VisiCalc, Lotus 1-2-3, and the other pioneers patterned themselves after the paper-based spreadsheets money managers had



PowerStep

◆◆ (beta)

A capable spreadsheet, equipped with most of the power features pioneered by leading PC and Mac spreadsheets, marred by an Interface-Builder-gone-wild design.

Price to be announced.

Ashton-Tate Corporation, 21010 Hamilton Ave., Torrance, CA 90509. 800/437-4329, ext. 3717

Wingz 1.1

◆◆◆

A powerful, English-like programming language and stunning 3D graphics put this spreadsheet out front for users who care about those things. However, rudimentary file links and 2D files that make modeling difficult, and a clunky interface, make this a less than stellar entry.

$699

Informix Software, 16011 College Blvd., Lenexa, KS 66219. 913/599-7100, 913/599-7350 fax

Lotus Improv 1.0

◆◆◆◆ (beta)

With a revolutionary model custom-made for data analysis, Improv is an essential spreadsheet for anyone doing financial modeling. In its first release, however, it lacks such basic important features as an undo command and a macro language.

$695

Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. 617/577-8500.

been using for ages. Since electronic recalculation of formulas was so much faster than working it out by hand, spreadsheet programs were quickly adopted for budget planning, bookkeeping, tax calculations, inventory control, and many other tasks. These pioneers offered a few basic graphs for analysis but didn't give you much control over their appearance. Spreadsheet data and charts couldn't be printed side by side and had to be stored in separate files. (Several popular programs still suffer from such limitations.)

These early programs were enormously useful, but complex applications meant sprawling worksheets. Navigating your way around a spreadsheet with hundreds (or even thousands) of rows and columns was a real headache, and though smart users managed the task with macros, the sheet-of-paper metaphor started to wear thin.

Second-generation programs, like Excel, solved this problem by letting you break a spreadsheet up into a group of linked, bite-size files. File links also helped to consolidate or "roll up" a group of similar spreadsheets, such as profit-loss statements from various regional divisions of a company. Instead of combining the data from each region's spreadsheet into a master file, formulas in a summary worksheet could simply reference the data in the regional report files—and stay up to date as the subfiles changed.

Second-generation spreadsheets also offered better and more flexible output. The limited repertoire of graphs was expanded, and users got more control over the appearance of charts and reports, with a variety of fonts and colors, free-floating text labels, arrows, and drop shadows. The best second-wave programs let you paste live, hot-linked graphs right into a block of spreadsheet cells, simplifying operation and making it much easier to create sharp-looking reports.

That pretty much defines the state-of-the-art spreadsheet, though in the most recent programs both worksheets and graphs have gained a third dimension. 1-2-3 3.0, 1-2-3/G, and Supercalc5 stack up groups of row-and-column worksheets to form 3D, multi-page files. This eliminates the complexity of working with a group of files, and also lets you organize complex data more simply. For instance, a 3D budget worksheet might have a row for each account, a column for each quarter, and a page for each of several regions. This lets you forget about unwieldy file-linking formulas and just use simple formulas with 3D ranges. On the graphics side, perspective-view 3D charts, pioneered by Wingz, dress up drab data and make a stronger impact. Three-dimensional graphs also make it easier to spot trends within a large set of data.

Common ground. PowerStep, Wingz, and Improv all keep up the NeXT standard for powerful graphics and easy data exchange. All automatically create charts, including labels and legends, from selected spreadsheet data. Any of them will let you create elaborate reports and presentations that include spreadsheet data, graphs, formatted text, and graphics. All let you paste in text and PostScript graphics copied from other programs and can import data from other spreadsheets via 1-2-3 (.wk1) or delimited text files. However, none of the three programs imports 1-2-3 macros or provides links to external databases.

Since no NeXT spreadsheet standard exists, the two most popular spreadsheet programs, Lotus 1-2-3 release 2.2 and Excel 2.1, are used as the baseline for evaluating these programs. Unless specifically stated otherwise, the NeXT spreadsheets were found to have all the abilities of the PC and Mac standbys. These three will first be judged by how well they measure up to this basic standard for the category, and then by their performance against their individual market claims.

PowerStep. Ashton-Tate calls PowerStep "the next people's spreadsheet." They see it as the NeXT's answer to 1-2-3—a straight-ahead, workaday spreadsheet for the average user. True to that goal, PowerStep breaks no new ground, but combines many of the best features of old favorites 1-2-3, Excel, and Quattro Pro. It gives you most of what you expect in a basic spreadsheet, including a sophisticated macro language, top-notch file links, and a good variety of charting and presentation tools. However, other crucial features, such as a macro recorder, report headers, and context-sensitive help, are missing. (In fact, the only help offered is a 25MB set of WriteNow files of the program manuals, which you can load into the NeXT's Librarian program.) The only thing particularly NeXT-specific about PowerStep is its interface, which could serve as a good example to programmers of how *not* to use Interface Builder. It's overly complicated and confusing.

PowerStep's icon bar epitomizes the program's haphazard, Interface-Builder-gone-wild design. Only a few basic functions are present and clearly indicated (erase, move, save document). A couple more (insert rows/columns, delete rows/

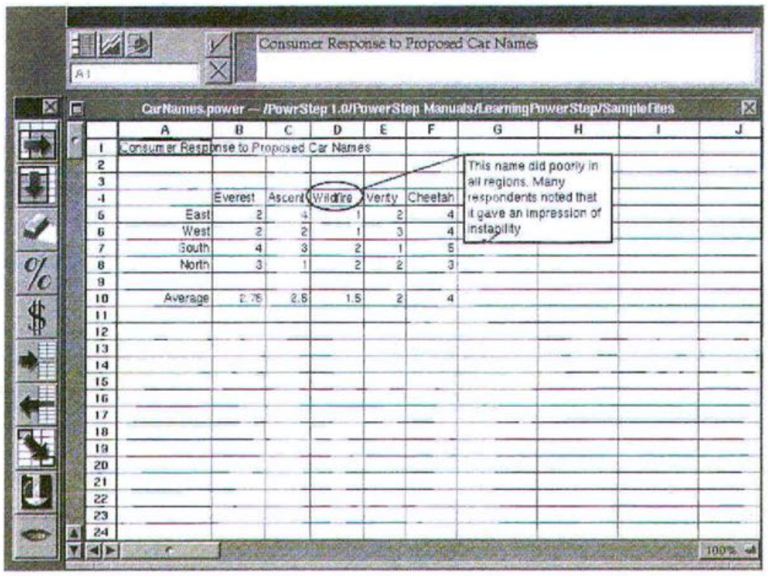
columns) are so ambiguously symbolized that it's easier to pick them from the menus. The rest of the bar is an arbitrary selection of less useful commands, such as formatting cells as percent with two decimal places. A much more sensible icon bar would offer functions to create charts, paste formula functions, and bring up the cell format panel.

Other elements of the program's interface follow the same sorry course. Drawing objects and lines, which most programs make quite simple with palettes, is confusingly split between menu choices and a bewildering variety of Inspector panels. These interface issues are especially important in the face of the product's goal of being an easy-to-use basic tool in the NeXT application dock.

Once you get past its confusing interface, PowerStep proves a capable spreadsheet with most of the power features pioneered by leading PC and Mac spreadsheets. Though files are strictly 2D, point-and-shoot file links make it easy to break complex models into manageable chunks. Spreadsheets and graphs update themselves instantly as linked data changes, and you don't have to load all linked files into memory the way you do in many programs. PowerStep's rich programming language lets you customize the program's menus and write your own functions, so power users can create bullet-proof, easy-to-use applications for those less technically adept. However, since there's no learn mode or macro recorder, even the simplest macro requires a laborious typing of commands.

You can create slick presentations with PowerStep, though it's not as easy as it should be. You can paste a graph anywhere in a spreadsheet and resize it at will, but if you need to change its data range, you have to delete it and start over. The 3D charts include not only the standard bars, but ribbon, wireframe, and area types, and changing their perspective is delightfully simple—you just drag a corner with the mouse and the graph rotates. (Lotus and Informix could learn a lesson here.) Unfortunately, the associated labels stay horizontal, and it can be nearly impossible to make long labels readable. In contrast to the awkward drawing process, creating rich text or Lip Service annotations is simple and straightforward.

There's a lot of power in PowerStep. But it's not the Everyuser spreadsheet Ashton-Tate promises, and to match the standards set by popular spreadsheets on other platforms it needs better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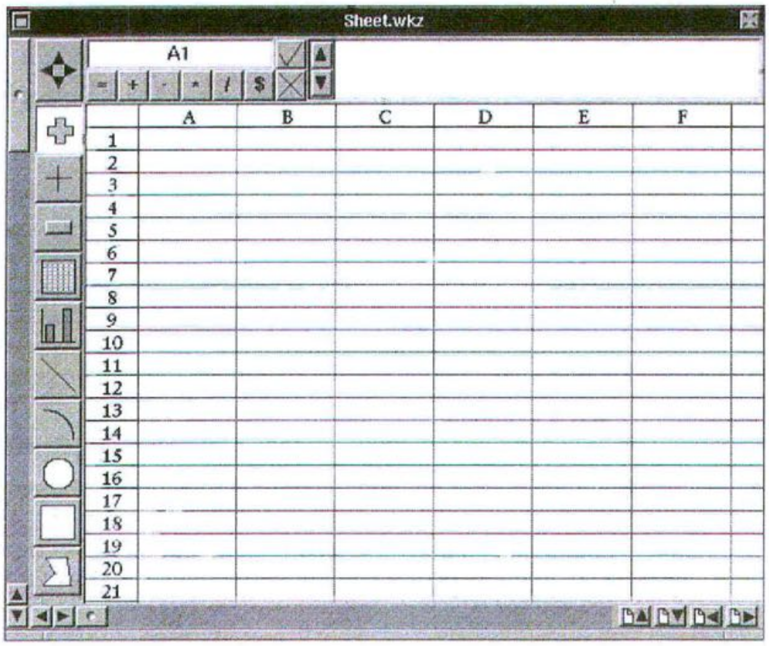
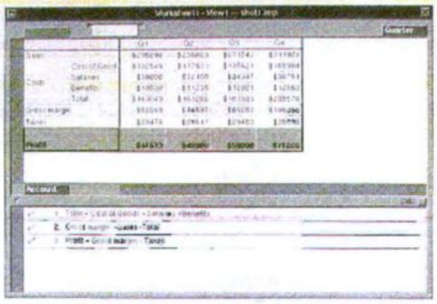
3						
4		Everest	Ascent	Wildfire	Verity	Cheetah
5	East	2	4	1	2	4
6	West	2	2	1	3	4
7	South	4	3	2	1	5
8	North	3	1	2	2	3
9						
10	Average	2.75	2.5	1.5	2	4

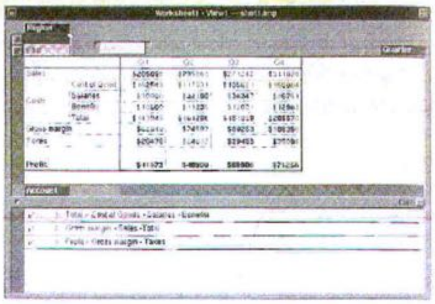
This name did poorly in all regions. Many respondents noted that it gave an impression of instability

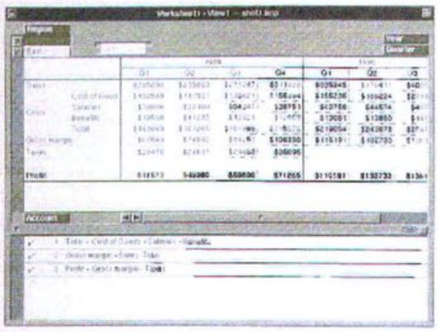
A PowerStep screen uses the standard row-and-column metatphor. The tool palette and the editing panel are separate from the spreadsheet window to give flexibility in arranging the workspace.

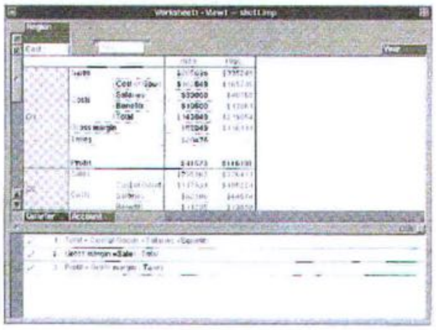


The familiar Wingz main screen is common to Wingz versions on every platform. Note the easy availability of drawing tools.



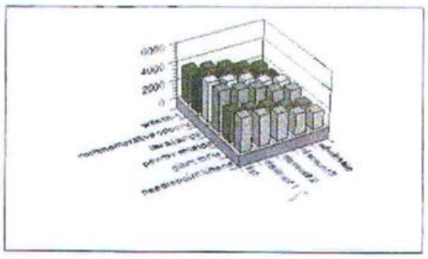


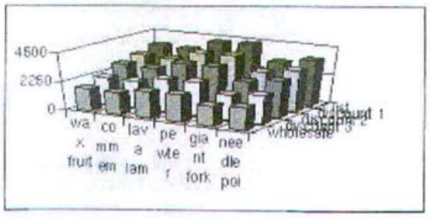


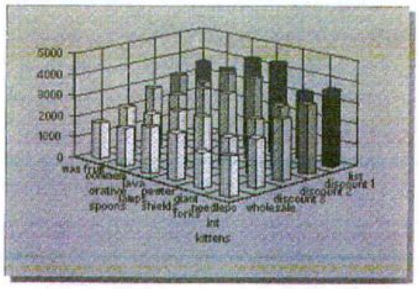


These illustrations show how Improv's new free-form structure operates. In the top left screen, note the English row and column labels and separate, plain-English, easy-to-follow formulas. Note also that the spreadsheet contains only cells that contain data. With the second screen, notice the move to 3D, with regions added in the upper left corner. This screen shows data for the Eastern region. Arrows are used to navigate between regions. The third screen adds a fourth dimension: years. The tags in the upper right show that the horizontal axis is organized by years, divided by quarters. The last screen shows the real power of Improv. The Quarter tag was simply dragged from the upper right to the lower left, creating a new view comparing quarterly earinings for two years. If the formulas had been affected, they would have been automatically updated.

A common 3D graph shows Wingz's graphics superiority. Wingz (at left) is the only spreadsheet that correctly rotates the text as you rotate the graph. PowerStep (center) provides greaty flexibility in moving the graph for clarity, but only certain configuations allow clear viewing of the labels. This isn't one of them. Improv (at right) also has trouble in this area.







presentation and report tools, a macro recorder, context-sensitive help—and above all else, a simpler interface.

Wingz 1.1. Informix claims that Wingz offers the most advanced graphics, presentation, and programming tools of any spreadsheet, yet is so easy to use that even novices can customize the program to their own liking, or write complex, button-driven applications.

It's true that Wingz is in some ways the most powerful spreadsheet available on the NeXT or any other platform. It covers all the basics (though its file-linking talents are substandard) and adds dazzling 3D charts and an English-like programming language to customize menus or build HyperCard-style applications. There's nothing about Wingz that is unique to the NeXT, though—it's nearly identical to versions of Wingz for PCs, Macs, and Sun and HP/Apollo workstations. It's an advantage to be able to share Wingz files with users on those other platforms, and Wingz is the only one of the three programs reviewed that can import or export Excel files. Informix's claims are greatly exaggerated on one point, though: Wingz's klunky interface, lousy online help, and sketchy documentation make it relatively hard to use.

Wingz has one of the most awkward interfaces available on the NeXT. For instance, there's no centralized font panel. Instead, you pick the typeface from a scrolling list, then set each attribute (size, color, style, and so on) with a separate menu. Cell, chart, and graphic formats all follow this scattered approach. Another odd element is the program's use of two cursors. If you have the worksheet cursor selected and click on a chart, rich text, or graphic object, nothing happens; ditto if you have the object cursor selected and click on a cell. Lots of other programs are clever enough to deal with complex documents without putting you through that kind of rigmarole. There's an undo command, but it only works part-time; it's grayed out after many commands. These design flaws make Wingz harder to learn and, by making common tasks needlessly difficult and time-consuming, remain a constant irritation even once you've mastered the program.

On-line help is limited. Context-sensitive help is available only for menu items, and there's no find command to help track down information. There is an alphabetical list of help screens, but it's not always easy to find what you want. You can refer to the written documentation or, if you have 38MB of free disk space, you can load disk files of Wingz's manuals into the Librarian for easy reference.

Except for the clunky interface, Wingz's graphing features are outstanding. It provides the widest selection of graphs of any spreadsheet, including over half a dozen 3D charts and unusual polar, contour, and X-Y graphs. You can paste a graph anywhere and can snap graphs, rich text fields, or graphic boxes to the cell grid for a clean, sharp layout. You can rotate 3D graphs and alter their perspective in several ways. Best of all, the text labels also rotate in space, making Wingz's 3D graphs far more readable than the competition's. You can also add the usual assortment of lines, ovals, rectangles, graphics, and text, but unfortunately no sound.

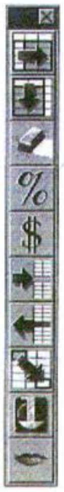
Wingz's other strong suit is its programming language, HyperScript. A learn mode lets you quickly whip out a basic program of Wingz commands, which can be used as a macro without further changes. But you can also switch into the HyperScript editor and use the stored commands as a basis for an application complete with its own menus, dialog boxes, visual or sound alerts, and other features (you can even incorporate C routines and other external functions). If you've mastered HyperTalk, BASIC, or some other programming language, HyperScript won't be much of a challenge. If you haven't, however, be warned that it's not quite as simple as recording and editing a macro: You have to master a slew of logical tests, variables, subroutines, if-then-else branches, and so on.

Complex modeling is made difficult by Wingz's 2D files and rudimentary file links. Although you can reference a cell or range in an external file in a formula, all linked files must be open. Even then, you have to be sure to recalculate all linked sheets to be sure the data is up-to-date. This severely limits the links' usefulness.

As a general-purpose spreadsheet, Wingz leaves a lot to be desired. It's too hard to use, particularly if you want to build complex models. But if creating the best graphs or some types of custom applications is a high priority for you, Wingz is probably worth the trouble.

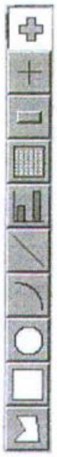
Improv. It's not just hype when Lotus says it has reinvented the spreadsheet. Improv's easy financial modeling, plain-English formulas, and multiple views of a single set of data have set the standard for the next generation of spreadsheets. Unfortunately, in its rush to market, Lotus

How intuitive are you?



PowerStep

- copy cells down
- copy cells right
- delete, shift cells up/left
- insert, shift cells down/right
- move cells



Wingz

- create button
- create text field
- select cell cursor
- select object cursor

Some of the icons above are self-explanatory—but some aren't. Can you match the listed functions to the proper icon? For extra credit, explain in 500 words or less why Wingz needs two cursors.

skipped over some basic features, like macros and undo. Nevertheless, Improv's breakthrough abilities—currently available only on the NeXT—make it a must-have program for financial managers, even if they need another spreadsheet to handle some of their more mundane tasks.

Why is Improv such a breakthrough? Let's use our 3D worksheet example, where we had a row for each account, a column for each quarter, and a page for each of several regions. That's a simple and efficient way to break down data by three criteria. But what if you wanted to break your data down not only by those three criteria, but also by year and department? That's where Improv takes over: It lets you keep on defining data categories even after you've run out of physical dimensions in which to display them. Let's say you create a year category across the top of the four quarters. New quarter columns appear for each new year you add. Next you might create a new department category to the left of the account labels; again, every time you add a new department, it will be subdivided into all the individual accounts.

Improv's categories let you build spreadsheets faster, but that's just the beginning. The real breakthrough is how they let you rearrange your spreadsheets after the fact. In our example, the rows break down departments into accounts, columns break down years into quarters, and there's a separate page for each region. That's fine for perusing the budget, but what if you want to compare travel expenses between departments, or look for seasonal variations between regions? In other spreadsheets, you'd have to build another section of the spreadsheet to break out regional totals by quarters—a tedious job.

Improv makes the task trivial. You simply drag a few category tiles from one corner of the spreadsheet window to another, and bang, you've got a new view of your data. You can open additional windows to get several views at once, and you can name and save views for reuse later, which means that different people can access the same data in different ways. For instance, a single Improv spreadsheet, shared across a NeXT network, could look like a line-item budget to a departmental manager, a profit-loss statement to an executive, and a balance sheet to an accountant.

Improv also makes it much easier to write, read, and understand formulas. Categories and detail items are more powerful than range names. For example, Improv is smart enough to apply "LIST PRICE – DISCOUNT = COST" separately to every part in an inventory; in a conventional spreadsheet, you'd need a separate formula for each part. All formulas are consolidated into a single window, so you never have to track down a chain of formulas from cell to cell. When two formulas overlap (as when you're totaling a group of columns and one of them contains row totals), Improv prompts you to choose one or write another.

Documentation and on-line help measure up to Lotus's traditional high standards. You can get help for any menu choice, panel, or other screen element by just clicking on it. The help screens are numbered and indexed like a book, so you can page through a section and know for sure you've read all the information on that particular topic. However, there's no disk version of the full documentation for use with Librarian.

Improv's charting and presentation features are merely average by today's standards. You get the standard range of chart types, plus 3D bars—though without diagonal labels they can be pretty unreadable. Since Improv worksheets have no fixed format, Improv includes a separate module for laying out reports. (If you pasted a graph into your worksheet, where would it go when you changed the view?) You can add text, graphics, and Lip Service sound to reports not only with Improv's built-in tools or by copying and pasting, but by dragging file icons from the Viewer onto an Improv report. There's one major flaw in Improv's presentation power: Although you can hot-link report graphs to spreadsheet data, cells of spreadsheet data pasted on the report are not updated as the spreadsheet changes. Another serious problem is that you can't zoom in for a close-up view of the report module to help make fine adjustments.

There are only a couple of pieces missing from the package, but they're doozies. Improv's worst fault is its lack of an undo command. When you're learning your way around a new and unfamiliar environment, you're sure to make mistakes. The way Improv spreadsheets are designed means that a single mistake can easily screw up an entire file, so undo is crucial. The other major problem is that there are no macros. Although many common macros are made obsolete by Improv's new features, it's irritating not to be able to automate repetitive tasks or customize commands, and without a programming language you can't create custom applications.

Despite the faults of this initial release, Improv can pay off for anyone who creates complex financial models, or spends a lot of time rearranging data for different analytical tasks. Its plain-English formulas also make it easier to learn and understand than its predecessors. Lotus should be commended for attempting to take full advantage of the NeXT platform. But until Lotus fills in the gaps in Improv's feature set, you may not want it to be your only spreadsheet.

Not an easy choice. So which of these spreadsheets should you use? First off, pass on PowerStep, at least in this version. It falls short of today's spreadsheet standards on several counts, and doesn't offer any innovations to make up for it. Improv and Wingz are both mixed bags: On the one hand, each has some unique and powerful tools; on the other, each comes up short on some of the basics. That means there's no single, overall best choice. Which is the best for you depends on the way you use a spreadsheet.

If complex financial models are your bread and butter, Improv, with its free-form structure and multiple views, wins hands down—and may well merit the purchase of a NeXT, if you don't have one already. Though it's overkill for simple tasks and you'll curse its lack of macros, Improv is probably also your best bet as a general-purpose spreadsheet. Just be sure to hit that Save command as often as possible, since returning to an earlier version of the file is the only way you'll be able to undo your errors. Also, Improv is the first of a really new generation of spreadsheets and has a lot of room for growth in future releases. The others are merely extensions of traditional second-generation spreadsheets.

If you need maximum-impact charts, you'll want a copy of Wingz, regardless of whether you use it for anything else. If you don't need complex models and you streamline its menus by creating keyboard shortcuts for the commands you use most often, Wingz could make a very serviceable everyday spreadsheet.

Unless you already own a NeXT, there is one additional reason you might pass up Wingz in favor of Improv. Wingz runs on PCs and Macs, whereas Improv is available only on the NeXT. So Improv offers you one more practical, mature, businesslike excuse for why you've just *got* to have a NeXT.

Robert Lauriston *is a self-employed computer industry pundit in San Francisco, California.*

3270Vision

by **Daniel Powers**

Many large companies have concluded that the NeXT is an exciting machine and could indeed change the way they look at and do business. Their next question is, "How can the NeXT access data on my IBM mainframe?" To solve this problem, Conextions has designed a family of products that provide mainframe connectivity.

3270Vision and its companion product, 3270Coax, allow the NeXT to emulate the popular IBM 3270 terminal. An emulator makes a mainframe think it is talking to a simple terminal, but the user retains all the advantages of a powerful workstation, such as multitasking and cutting and pasting information to other applications.

3270Vision is software for connection through the serial line. 3270Coax provides a direct connection from the SCSI port to an adapter box and then to an IBM 3174 or 3274 controller. It accommodates up to five terminal sessions, managing requests on a first-come, first-served basis.

I couldn't believe how neat it was to see an IBM host session on my NeXT. 3270Vision includes most of the features I consider important and desirable. First and foremost, it works. It establishes a standard session with an IBM mainframe. Another important feature is that it lets users alter the size of their windows. A menu option brings up a slider for varying the size of the font and the window. This is handy if you have many windows open on your screen. Full NeXTstep editing, cutting, and pasting are supported.

The straightforward approach to 3270 keys really makes this product stand out. Most terminal emulators require unnatural finger combinations to mimic special keys on the 3270 keyboard. Included in 3270Vision are 3270 Keys menus, command-key equivalents, and even a full 3270 keyboard. Users can point to any key on the keyboard and the corresponding key sequence will be sent to the host session. The full keyboard looks great and is a testimony to the power of Display PostScript.

The most notable shortcoming is the absence of an OIL (Operator Interface Line) at the bottom of the window. The OIL is reserved as a status line on all 3270 terminals and displays important information. Another missing piece is a file transfer utility. Both of these problems will be eliminated in an upcoming version, which we saw in Alpha.

All in all, Conextions has the beginnings of a great product. IBM mainframe access may not seem too exciting to some users, but to the majority of the computer world, it is a financial and business necessity. ⏀

Daniel Powers *helps manage the Workstation Hardware Engineering unit in the Computer Science Department of the Travelers Insurance Company in Hartford, Connecticut.*

CONNECTIVITY

3270Vision

◆◆◆◆ (beta)

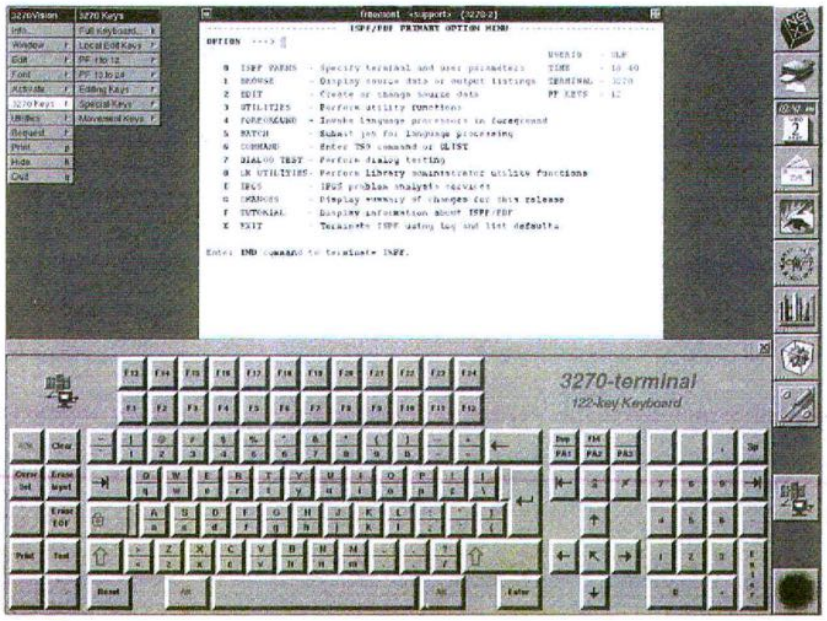
A powerful 3270 terminal emulator that allows IBM mainframe connectivity from the NeXTstep environment.

$695

3270Coax: A coax adaptor box that connects the NeXT's SCSI port to an IBM 3174 or 3274 controller.

$2295

Conextions, 79 Wildwood Road #200, Andover, MA 01810. 508/475-5411



```
------------------------  ISPF/PDF PRIMARY OPTION MENU  ------------------------
OPTION  ===>
                                                           USERID   - ULF
   0  ISPF PARMS  - Specify terminal and user parameters    TIME     - 10:40
   1  BROWSE      - Display source data or output listings  TERMINAL - 3278
   2  EDIT        - Create or change source data            PF KEYS  - 12
   3  UTILITIES   - Perform utility functions
   4  FOREGROUND  - Invoke language processors in foreground
   5  BATCH       - Submit job for language processing
   6  COMMAND     - Enter TSO command or CLIST
   7  DIALOG TEST - Perform dialog testing
   8  LM UTILITIES- Perform library administrator utility functions
   I  IPCS        - IPCS problem analysis services
   C  CHANGES     - Display summary of changes for this release
   T  TUTORIAL    - Display information about ISPF/PDF
   X  EXIT        - Terminate ISPF using log and list defaults

Enter END command to terminate ISPF.
```

TouchType and Create!

by Rick Reynolds

PostScript, as a programming language, provides fast, powerful ways to manipulate type and graphics. Unfortunately, however, it is so complex that it is used by relatively few people. TouchType and Create! are, in essence, killer front ends for calls to PostScript operators.

The NeXT's unique work environment—running many applications simultaneously and using a common imaging model—makes it practical for an application to focus on doing one small thing well. The NeXT user can create custom working environments by keeping several of these tools open at once. TouchType and Create! are two of these focused applications, made to complement other publishing applications. TouchType gives tight control over display type. Create! provides tools for adding special effects to graphics and text.

TouchType. TouchType is made to manipulate large-size type for book covers, titles, logos—any situation in which you need precise control over your type. RightBrain Software takes this limited task and delivers in spades. The program only takes up 232KB, and you cannot possibly get lost using it.

Kerning (controlling the horizontal spacing between letters) is TouchType's main mission, although the program can do a lot more than that. Kerning is adjusted through a kerning tool slidebar, as well as through a kerning menu with quick-key equivalents, by selecting a combination of characters and tapping the cursor keys (my favorite), or even by grabbing letterforms with the mouse and simply moving them as if they were drawing objects.

If you have never really caught on to why some people are so picky about kerning, using this program is a guaranteed route to understanding that obsession. After two hours with TouchType, I had become a compulsive kerner.

You can also control leading (the vertical spacing between lines of type) or change the baseline of one or more characters within a word. Even with characters spread all over the page, TouchType remembers the order, making editing easy.

The interface of the program shows many innovations. For example, when a character is selected, it is changed to an easy-to-spot gray, instead of being given a bounding box or anchor points. One interface drawback is the program's use of arcane keystroke combinations for what should be shortcuts.

I have one major problem with this package. The first time this application is started up *from each user account,* an incredibly presumptuous automatic e-mail function is called to register the use with RightBrain Software. This is completely beyond the user's control. It is, however, the only serious drawback of this otherwise straightforward and satisfying application.

Create! Create! is designed for making graphic objects and assigning PostScript effects to them. In some ways Create! works like a paint program, but it is set apart by its use of Display PostScript, which allows for richer effects. This is the first such full-featured color paint program for the NeXT platform. (Create! is a superset of TextArt, released in 1989.)

One use of Create! is to make free-standing graphics, logos, or illustrations, but its real power is to make elements that drop into other documents. If you decide you need to jazz up a project you're working on in another NeXT program, you can run Create! simultaneously to add special effects to your text, or create and add graphic elements. Stone Design provides a library of objects to start with.

Create! uses the standard NeXT color picker to set color attributes, then goes further. By selecting a range of tones defined by two colors, you can ask Create! to shade the values in between, using a selection of algorithms. In contrast to the pared-down essentials of TouchType, Create! makes it easy to forget what you are doing and just go off and have fun. Fun effects like neon and alpha-channel transparency are part of the package.

Create! is a must for any color machine, but it is also useful in black and white. This product was reviewed very early in its development cycle and had no significant drawbacks. We are assigning four cubes to the product now, but when we can evaluate it after release, this rating may rise to the rare five cubes.

Rick Reynolds *is executive director of the Bay Area NeXT Group and owns a Macintosh and NeXT graphics service bureau in San Francisco.*

GRAPHICS

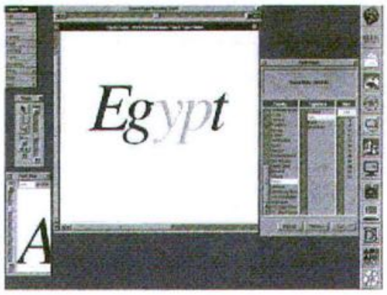
TouchType

■ ■ ■ ■

"Accessory software" for creating and controlling display type for book covers, titles, logos, and other projects. Simple to use and powerful.

$249

RightBrain Software, 20 Medway Road, Woodside, CA 94062. 415/851-1785, 800/472-7246



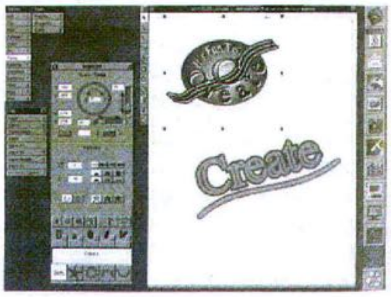
Create!

■ ■ ■ ■ (beta)

A full-featured Color PostScript drawing and paint environment for manipulating and adding special effects to graphic objects and text.

$495; low-cost upgrade for TextArt owners.

Stone Design Corporation, 2425 Teodoro NW, Albuquerque, NM 87107. 505/345-4800



Diagram!

by Rick Reynolds

Diagram! is a graphics application for people who need to think and draw at the same time. Whether you're doing business presentations, desktop publishing, or graphic design, Diagram! is an easy-to-use program that produces fast, professional results—even for those of us who can boast little to no artistic talent. This versatile "digital whiteboard" is a flexible application that may change the frequency and ease with which you use diagrams.

A diagram, drawn either by hand or by computer, is a visual aid that conveys the relationships between people, processes, or any other discrete entities. A computer-generated diagram usually draws the related units as objects and designates the relationships between the units with connecting lines. Diagram! follows this approach.

Diagram! doesn't look like your average drawing package because the toolbox is noticeably absent. Instead, you are given a ready-made palette of objects and primitives to copy into your window and manipulate. (Diagram! also lets you define your own objects.) Starting a diagram is astonishingly simple—merely drag objects onto a fresh page and label them, then connect the objects with lines. This is a remarkably fast and productive way for novices to produce professional-looking graphics. The user interface is generally simple and intuitive.

Once you copy an object, label it, and draw a line from the label text to the object, the line becomes firmly anchored to that object. If you decide to shift things around in your diagram later, the lines remain connected to the objects they are anchored to. In any other program, you would be forced to create the lines all over again.

Another major advantage: Diagram! allows you to establish hot links between the drawing objects on your canvas and documents outside the application, making it a passable hypertext tool. For example, an Improv spreadsheet could be attached to a product management plan. (Clicking the link symbol would show the spreadsheet.) There is also a voice annotation feature.

Diagram! works just as well on a color platform. The standard NeXT color picker can set any color attributes, just as you would expect.

On the downside, Diagram! may give the user a little too much freedom. The process would be easier if templates were included to handle some routine diagrams. It would be less confusing if the icon for the hot link looked more like a standard NeXT icon and less like a picture element. Also, the name of the "file linked to" should appear with the link. But these are small kinks in an otherwise smoothly operating system.

How will Diagram! change the way you do graphics? If your standard *modus operandi* has been to use clip art, you can still maintain the speed and professional quality you are accustomed to, but you can have more control. If you usually scribble a sketch on a piece of paper and hand it to an assistant to "do on the computer," you may be able to whip out a final version yourself, in half the time. In either case, keep in mind that the power behind this product makes it more than merely a replacement for your old graphics package. Diagram! is a better way to think about and outline a process—be it an organization or a manufacturing line—and convey your thoughts clearly to others. ⊕

Rick Reynolds *is executive director of the Bay Area NeXT Group and owns a Macintosh and NeXT graphics service bureau in San Francisco.*

GRAPHICS

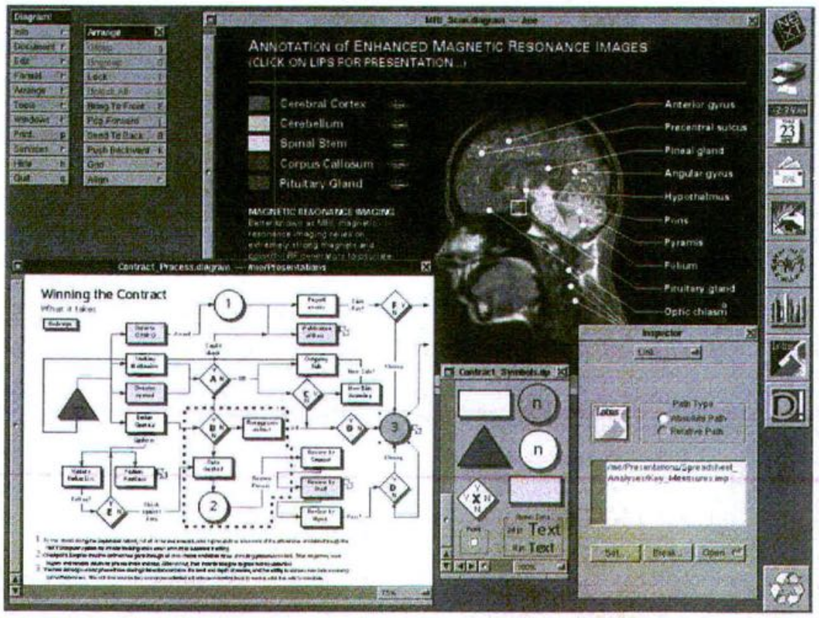
Diagram!

● ● ● ● (beta)

A "digital whiteboard" that creates everything from organizational charts to annotated illustrations.

$399 (shipped on floppies)

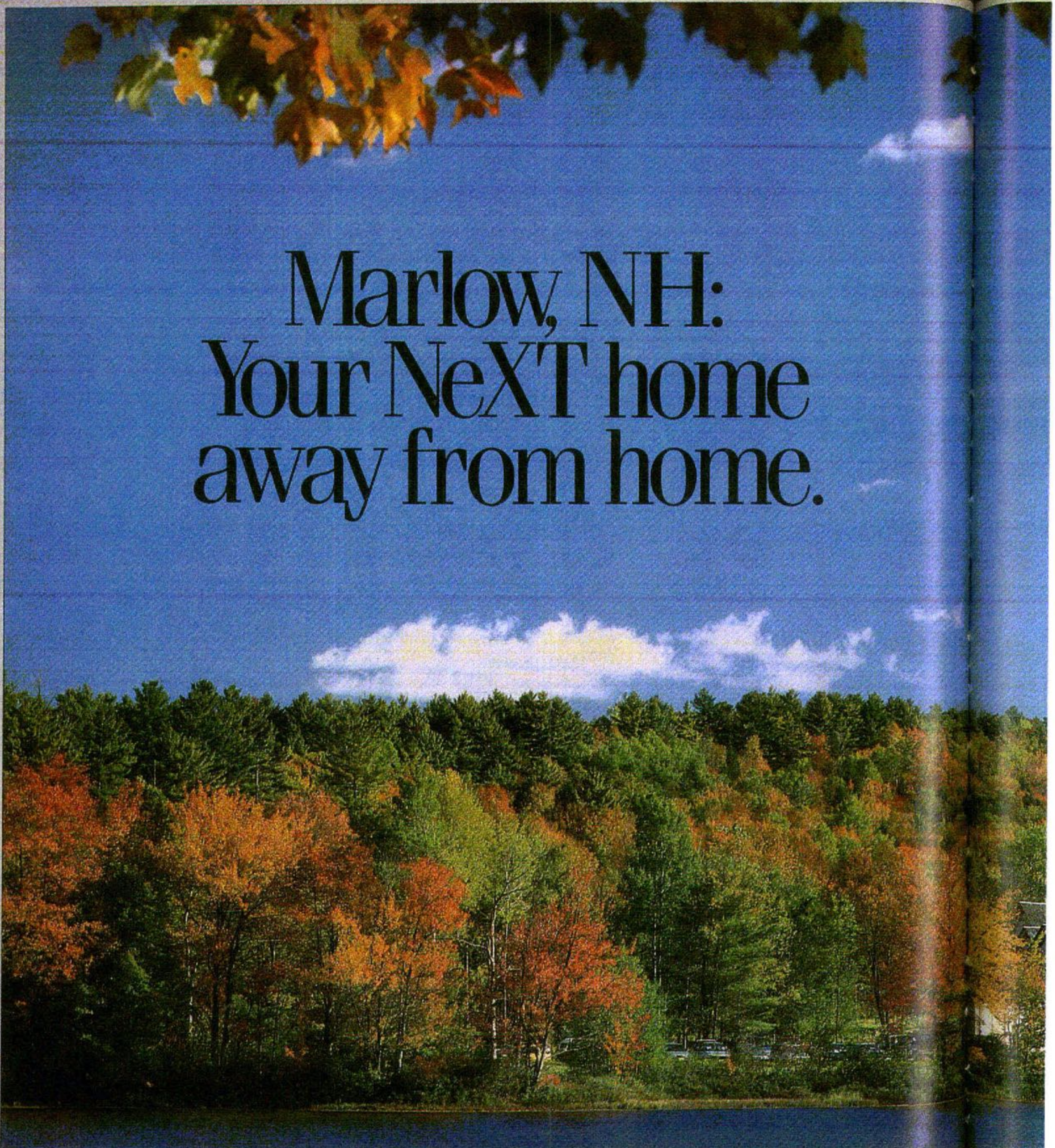
Lighthouse Design Ltd., 6516 Western Ave., Chevy Chase, MD 20815. 301/907-4621, 800/366-2279



ANNOTATION of ENHANCED MAGNETIC RESONANCE IMAGES
(CLICK ON LIPS FOR PRESENTATION...)

Diagram!
Info
Document
Edit
Format
Arrange
Tools
Windows
Print
Services
Hide
Quit
Arrange
Lock
Bring To Front
Send To Back
Grid
Align
Cerebral Cortex
Cerebellum
Spinal Stem
Corpus Callosum
Pituitary Gland
MAGNETIC RESONANCE IMAGING
Anterior gyrus
Precentral sulcus
Pineal gland
Angular gyrus
Hypothalmus
Pons
Pyramis
Folium
Pituitary gland
Optic chiasm
Contract_Process.diagram
Winning the Contract
What it takes
1
2
3
A
B
C
D
E
F
Contract_Symbols
n
Text
Inspector
Link
Path Type
Absolute Path
Relative Path
Set...
Break...
Open
75%

Marlow, NH: Your NeXT home away from home.



Dear Friend,

In 1982, David Hall and I started a business called PC Connection here in Marlow, NH (pop. 564). We sold peripherals and software exclusively for the IBM PC and backed every sale with toll-free technical support.

In early 1984, we founded MacConnection. It was the first mail-order company for the Mac and has set many new standards in computer mail-order, including money-back guarantees and $3 overnight shipping *(you can actually get same-day delivery* between midnight and 3:15 a.m.).

By 1987, we were #2 on *Inc.* magazine's list of 500 fastest-growing privately-held companies. And today, our company has grown from just two employees (David and myself) to about 300—all in this small New Hampshire town. In fact, that's our corporate headquarters in Marlow's historic "Christmas Trees Inn" shown below.

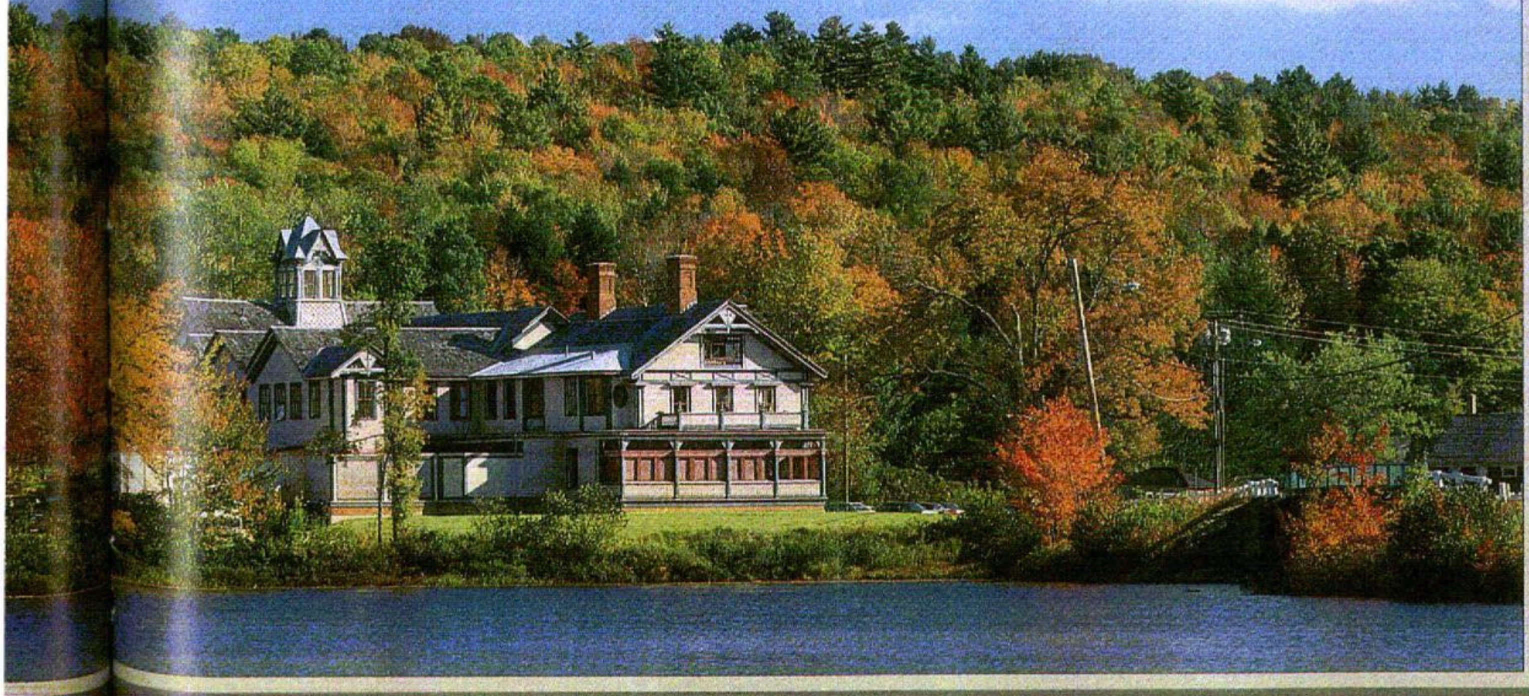
Now we're bringing our eight years of mail-order expertise to NeXT computers. Like our other divisions, NeXTConnection has its own sales and support staff and every product is backed by toll-free technical support. Your order will ship overnight for just $3. And it will arrive in a tight-fitting box, cushioned with clean and recyclable newsprint. You'll find our very first collection of software and peripherals for NeXT computers on the following pages.

Now that we've shown you where we're coming from, we'd love to show you just how convenient, risk-free, and inexpensive buying by mail order can be. Our phone lines are open all day and all night from 8 a.m. EST Monday straight through 5:30 p.m. EST Saturday. Whether you want answers or products (or both) feel free to call anytime: 1-800/800-NEXT.

Sincerely,

Pat Gallup

Patricia Gallup, President & CEO



THIS DRAWING TOOL TELLS ALL.

LIGHTHOUSE DESIGN

A graphics tool for people who think and draw ...at the same time. Here's a drawing program intelligent enough to *really* put your ideas across. **Diagram!** is a true digital whiteboard on which you can create compelling combinations of diagrams, drawings, and data. And its innovative file-linking feature lets you include data from other NeXT applications. That's right, you can drop a spreadsheet file, for example, right into your drawing. Setting links is easy, too. Just drag a file icon over a drawing object and drop it in.

Diagram! includes a full array of drawing tools and lets you do formerly tedious jobs (like decision trees or PERT diagrams) with only a couple of keystrokes. Store frequently used drawing objects in symbol palettes and customize any object quickly. Once you connect objects (like labels or captions), they stay connected no matter how you move them around. Diagram! also allows you to add voice annotation so your drawings can talk to your audience. And they can even respond with their own comments and feedback. This is definitely the next step in drawing technology. Also available on optical disk.

Want to get your hands on a lot of great NeXT shareware? The **Big Green Disk** gives you more then 400 megabytes of software, utilities, games, and other useful files on a single optical disk, including bundled GNU programs, MIT's X windowing system and hundreds of UNIX programs. And for each Big Green Disk sold, Lighthouse Design will contribute $5 to environmental charities.

Lighthouse Design ... 60 day MBG

8621	Diagram!. . . . . **intro. price**	**$209.**
8660	Diagram! *(optical disk only)* **intro. price**	**339.**
8663	Big Green Disk *(optical disk only)*.	**249.**

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8661
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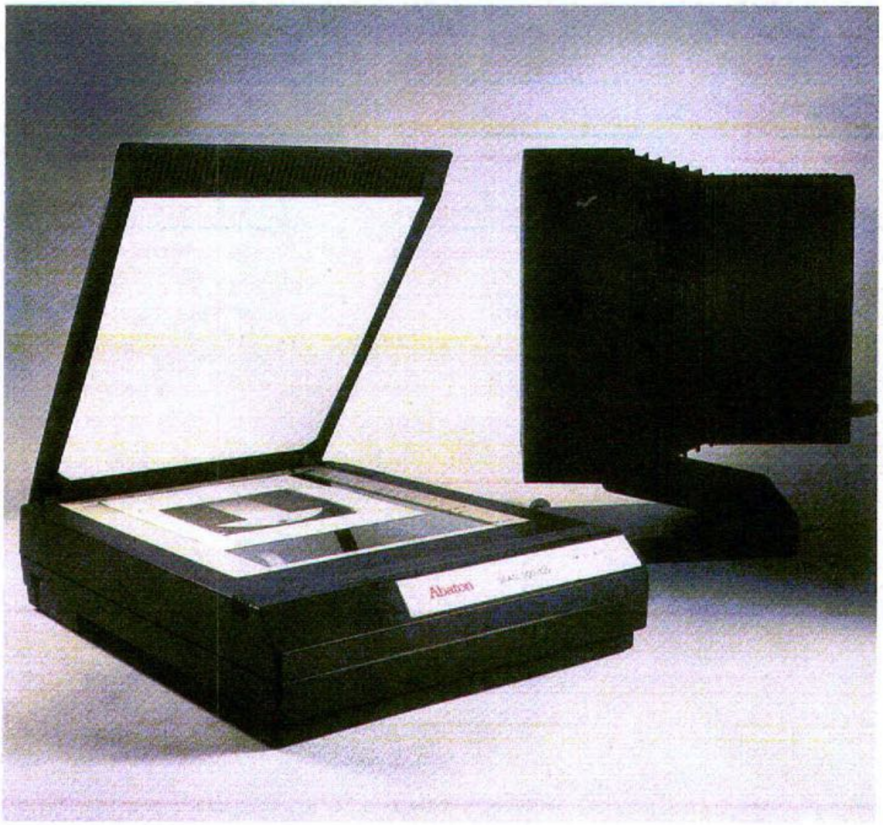
ABATON

Tip the gray-scale in your favor. Abaton's **Scan 300/GS** is a 300dpi 8-bit scanner that can deliver 256 shades of gray for quality reproduction of even continuous-tone photos. Five different scanning modes (for line art, halftone, and gray-scale images) give you the clarity you need. The included software lets you precisely control brightness and contrast. You can even preview images before scanning. And the large flatbed design (with a removable lid) lets you easily scan oversized documents.

Get your communications together. What's the next horizon in communications? The **InterFax** which gives you NeXT fax *and* modem capabilities in one unit. Send and receive faxes at 9600bps to just about anyone, anywhere with ease. The built-in 2400bps modem is loaded with features, including automatic data-to-voice switching, built-in diagnostics, and much more. And with MNP-5 data compression, you can send files at an effective rate of up to 4800bps. And it comes with the communications software you need to automate all your fax and modem routines.

Abaton ... 30 day MBG

8620	Scan 300/GS *(includes optical disk)*	**$1499.**
8665	InterFax	**539.**



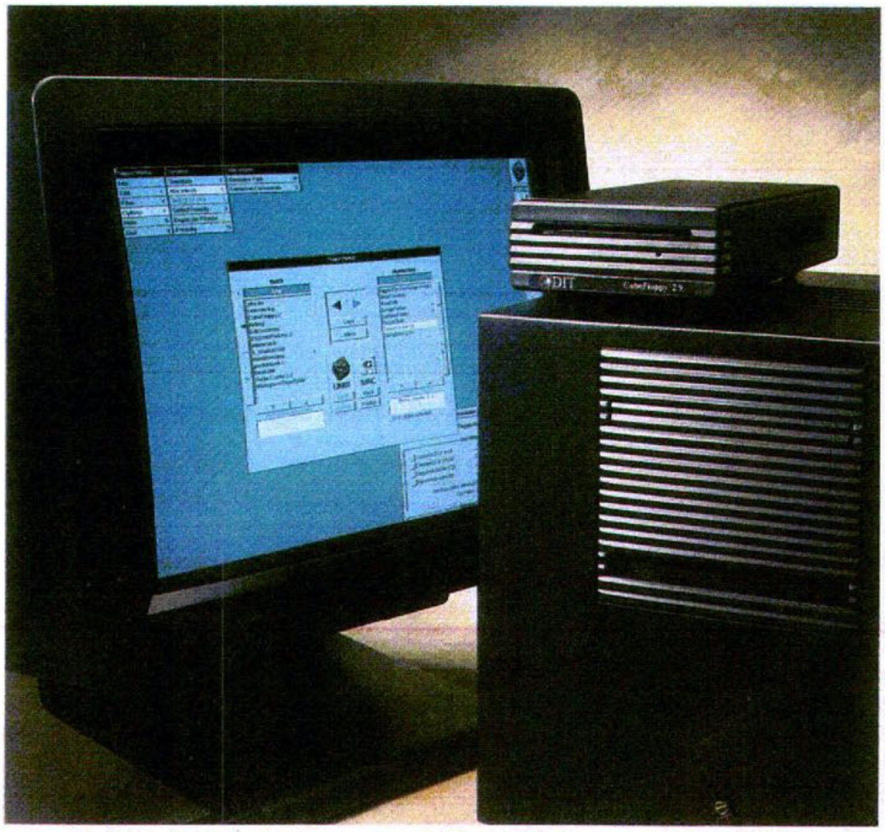
DIGITAL INSTRUMENTATION TECH.

Rapid Transfers. Your NeXT can share files with other personal computers when you have **FloppyWorks**. This easy-to-use file-transfer software works with any NeXT floppy drive and can format, read, and write Mac, MS-DOS, NeXT, and OS/2 disks. With its intuitive interface, files from the hard disk and the floppy disk are displayed side by side (like the browser). And the built-in filters (translators) let you import or export data from all sorts of applications. Supported file formats include RTF, TIFF, WriteNow, WKS, WK1, SYLK, .wkz, .eps, .ps, and ASCII. It's the software you need for serious file sharing.

Don't have a floppy drive? Just connect DIT's **CubeFloppy** 2.9 to your NeXT via the SCSI interface and start reading and writing other popular computer formats (under NextStep 2.0). CubeFloppy 2.9 is compatible with NeXT's Automounter so it's the easy, convenient way to add a floppy drive to your NeXT.

Digital Instrumentation Tech.

8656	FloppyWorks	**$185.**
8661	CubeFloppy 2.9 w/FloppyWorks	**579.**
8662	CubeFloppy 2.9	**499.**



NeXTConnection

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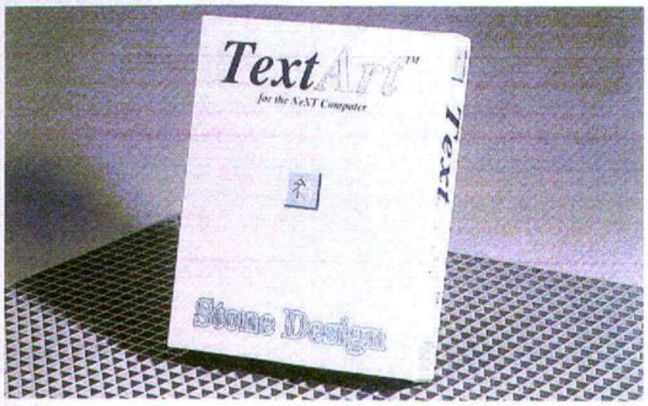
Peripheral Land
8547 SuperFloppy 2.88. . . . . **$449.**



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Stone Design
8658 TextArt . . . . **$319.**

PRODUCT INDEX

	Abaton ... 30 day MBG	
8620	300/GS Scanner *(optical disk)*	$1499.
8665	Interfax	539.
	Adobe	
8622	Plus Pack *(optical disk)*	299.
	Digital Instrumentation Technology	
8659	CubeFloppy Plus *(w/FloppyWorks)*	639.
8661	CubeFloppy 2.9 *(w/FloppyWorks)*	579.
8662	CubeFloppy 2.9	499.
8656	FloppyWorks	185.
8657	On Duty	209.
	Frame Technology	
8241	FrameMaker	$799.
	Lighthouse Design ... 60 day MBG	
8621	Diagram!	209.
8660	Diagram! *(optical disk)*	339.
8663	The Big Green Disk *(optical disk)*	249.
	Maxell ... 60 day MBG	
2793	DS/HD 1.44 MB Diskettes *(Qty. 10)*	27.
	Memory ... 2 year warranty	
1107	1 MB x 8 80ns SIMMs	call
	Moustrak ... 60 day MBG	
8548	Black 9" x 11" Mouse Pad	9.
8576	Black 7" x 9" Mouse Pad	8.
	Pacific Microelectronics	
8244	Hard Drive Enclosure	$469.
	Peripheral Land, Inc.	
8547	SuperFloppy 2.88 *(requires cable)*	449.
8673	ST4385N 320M Ext. Hard Drive	call
8675	ST4350N 300M Ext. Hard Drive	call
	Sony ... 60 day MBG	
3298	DS/HD 1.44 MB Diskettes	22.
	Stone Design	
8658	TextArt	319.
8666	TextArt *(optical disk)*	549.
	Toshiba	
8641	2.88 MB Floppy Disk	19.

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In Context

Cyberspace: The Shock of Entry

Late in 1978, a Wall Street bank asked me to assess its first application of advanced information technology to clerical work. It had dramatically restructured its approach to the production of several key products, such as loans and letters of credit. Clerks who had performed one small operation in a long paper chain were, for the first time, using computer technology to accomplish all the functions associated with a single product. Visiting the bank's offices, I witnessed a sight that would eventually become so familiar as to defy notice—an entire floor of people seated at their partitioned workstations, staring into the screens of desktop terminals. At that time the experience was still peculiar enough, for both the clerks and their managers, as to provoke concern. The clerks seemed to have more difficulty adapting to these conditions than anticipated, and the first phase of the new effort resulted in sky-rocketing error rates. Managers believed that they had enriched the clerical job, and they could not explain the sense of malaise that had swept over the back office. I proposed to interview a broad sample of clerks and managers and to determine the sources of these troubles.

The technological change was one among many subjects we discussed during these interviews, but it was the one for which their responses were the most puzzling. Many people voiced distress, describing their work as "floating in space" or "lost behind the screen." They complained that they were no longer able to see or touch their work. Many felt that they no longer had the necessary skills or understanding to function competently. I did not know how to make sense of these comments, but I could not stop thinking about them either. . . .

A vision came together for me. . . . I realized that the people I had been interviewing were on the edge of a historical transformation of immense proportions, as important as that which had been experienced by the eighteenth- and nineteenth-century workers.

Shoshana Zuboff, *In the Age of the Smart Machine: The Future of Work and Power* (Basic Books, 1988)

The combined technologies of the telephone, computer, and television have merged into an integrated information and communication system that transmits data and permits instantaneous interactions between persons and computers. . . . We have for the first time an economy based on a key resource that is not only renewable, but self-generating. Running out of it is not a problem, but drowning in it is.

John Naisbitt, *Megatrends: Ten New Directions Transforming Our Lives* (Warner Books, 1982)

It is thought that the masses may be structured by injecting them with information. . . . Quite the contrary. Instead of transforming the mass into energy, information produces even more mass . . . the final result being precisely an atomised, nuclearised, molecularised mass. . . .

Jean Baudrillard, *In the Shadow of the Silent Majorities or, The End of the Social and Other Essays, Semiotext(e) Foreign Agents Series* (Columbia University, 1983)

Sloughing off every layer of macrocosmic apparatus, the computer will ultimately collapse to a pinhead that can respond to the human voice. In this form, human intelligence can be transmitted to any tool or appliance, to any part of our environment. Thus the triumph of the computer does not dehumanize the world; it makes our environment more subject to human will.

Giving up the superficial comforts of a human-scale world, mankind moves to mind scale. In the image of his Creator, he exalts the truly human—and godlike—dimension of his greatest gift from the Creator: his creativity. Giving up the material idols and totems in his ken, he is gaining at last his promised dominion over the world and its creatures.

George Gilder, *Microcosm: The Quantum Revolution in Economics and Technology* (Simon & Schuster, 1989)

[Smart machines] have a seductive appeal to the scientific imagination, which has freely borrowed them as models of the universe at large, often reshaping our experience of the world to make it fit that model. And in this there can be the real danger that we fall prey to a technological idolatry, allowing an invention of our own hands to become the image that dominates our understanding of ourselves and all nature around us.

The computer is the latest episode in this scientific infatuation with mechanistic metaphors borrowed from smart machines. Once again, as in the age of Newton, the scientists need to be reminded that the organisms (human beings) which came before mechanisms are far more remarkable pieces of work than the tools they may occasionally invent when they are not spending their time singing songs, making jokes, telling tales, or worshiping God.

Theodore Roszak, *The Cult of Information: The Folklore of Computers and the True Art of Thinking* (Pantheon Books, 1986)

As far back as four years ago, the group of scientists about Dr. Rosenblueth and myself had already become aware of the essential unity of the set of problems centering about communication, control, and statistical mechanics, whether in the machine or in living tissue. On the other hand, we were seriously hampered by the lack of unity of the literature concerning these problems, and by the absence of any common terminology, or even of a single name for the field. As happens so often to scientists, we have been forced to coin at least one artificial neo-Greek expression to fill the gap. We have decided to call the entire field of control and communication theory, whether in the machine or in the animal, by the name Cybernetics, which we form from the Greek [word for] steersman, . . . also . . . refer[ring] to the fact that the steering engines of a ship are indeed one of the earliest and best-developed forms of feedback mechanisms.

Norbert Wiener, *Cybernetics: or Control and Communications in the Animal and the Machine* (MIT Press, 1948 and 1961)

Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts. . . . A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights, receding. . . .

William Gibson, *Neuromancer* (Ace Books, 1984)

In Context *is a selection of readings from published works that shed light on the intersection of life and technology. We welcome contributions from readers. Please send them to In Context, NeXTWORLD, 501 Second Street, San Francisco, CA 94107, MCI NeXTWORLD, or send e-mail to nextwrldimmiley@uunet.uu.net.*

The NeXT World

Edited by Dan Lavin and Declan McCollough

Welcome to The NeXT World, a forum for the NeXT community at large. Through this department you can hear the buzz of the community and find the information you need to become an active member in it.

The NeXT community is an invaluable pool of information about the NeXT computer. NeXT user groups (NUGs) and on-line news groups provide a place for computer users to help other computer users. Participants contribute a rich variety of information, based on their own experience, to help you with the puzzles you face at your own computer and enrich your knowledge about the platform.

User groups are organizations of people who come together regularly to share what they know and to learn from speakers and other members. They typically hold monthly meetings, publish a newsletter, distribute public-domain software, and provide an electronic bulletin board and educational programs.

Large and small NeXT user groups have been established around the world. The Boston Computer Society NeXT Users Group is the largest and oldest. Founded in October 1988, it now boasts 900 members. BCS meets monthly in conjunction with the MIT user group, publishes the monthly newsletter *What's NeXT*, and provides many other services.

The Bay Area NeXT Group (BaNG) is the hometown team for NeXT. Founded last spring by Robert Nielson, BaNG has hosted some of the most exciting meetings to be found. Where else can you ask a question about NeXTmail and have Bryan Yamamoto, its author, raise his hand and answer from the audience? BaNG meets monthly at Stanford and also produces a newsletter.

Erica Leibman at the Georgia State Users Group publishes the *NeXT Users Journal*, originally known as the *BUZZNUG Journal*, a monthly newsletter of 50 pages or more that provides detailed technical information about the NeXT. The *NeXT Users Journal* is free to anyone and available on the Internet.

In this issue, The NeXT World presents a complete list of the NeXT user groups in operation at press time. You can get more information about any of these groups by contacting the person listed with the supplied address. In future issues, we will publish highlights from user group meetings and newsletters.

More informal "meetings" take place on line, on the comp.sys.next newsgroup on the Internet. In its basic form, a newsgroup is a collection of public messages submitted by participants of the group for all to read. The comp.sys.next newsgroup is the primary forum for information about NeXT and NeXT computers.

Most universities and large corporations have a link into the Internet. Started as a private network under the aegis of the Department of Defense, the Internet has, during the last five years or so, begun to accept links and traffic from major corporations and research organizations. The Internet now links over 100,000 computers.

The exceptional thing about comp.sys.next, however, is not its impressive size, but that out of this seemingly chaotic web of networks and computers, a strong NeXT community has emerged. This community is dynamic; it encourages newcomers to ask questions, while simultaneously serving as a discussion group exploring the limits of technology. The newsgroup receives regular contributions from users at major universities, dozens of hardware and software companies, and even from within NeXT itself. Quite often it yields tantalizing glimpses of the future.

If your company or organization has access to the Internet, ask your system administrator how to access comp.sys.next. Once involved, you can read news, post messages, and send private mail to anyone else on the Internet. For those who don't have access to the Internet, the comp.sys.next section of The NeXT World summarizes the highlights of recent exchanges on the network.

NeXT User Groups

Here is a list of the major operating NeXT user groups, organized by region. For more information on NeXT user groups, send e-mail to usergroup@next.com or call 800/848-NEXT.

UNITED STATES

Alaska

Arctic Circle NUG
Aaron Morse
P.O. Box 900-641
University of Alaska
Fairbanks, AK 99775
907/479-2247
e-mail: fsapm@alaska.bitnet

California

BaNG (Bay Area NeXT Group)
Rick Reynolds
P.O. Box 8858
Stanford, CA 94309
415/ 243-9140
e-mail: BaNG-request@meta-x.stanford.edu

SCaN (Southern California NeXT Group)
Michael Mahoney
Dept. of Computer Science and Engineering
California State University, Long Beach
Long Beach, CA 90840
213/985-1550
e-mail: mahoney@grafix.cse.csulb.edu

SNuG (San Diego NUG)
Nicholas MacConnell
1135 Stratford Ct.
Del Mar, CA 92014
619/481-7535 or 619/565-9738
e-mail: tfinn@next.com
newsletter editor: Bruce Webster

Colorado

rmNUG (Rocky Mountain NeXT Users Group)
Dave Hieb
4521 Wellington Rd.
Boulder, CO 80301
303/530-2560
e-mail: davehieb@boulder.colorado.edu

District of Columbia

NeXT Special Interest Group
Hugh O'Neill
P.O. Box 39036
Washington, DC 20016
703/938-NeXT (Joel McClung)
e-mail: joel@next.com

Georgia

BuzzNUG (Georgia Tech NUG)
Erica Liebman
1150 Collier Road NW Apt L-12
Atlanta, GA 30318
404/352-5551
e-mail: erica%kong@gatech.edu
newsletter editor: Erica Liebman

comp.sys.next

Comp.sys.next is a compilation of the most interesting recent exchanges on comp.sys.next, the NeXT newsgroup on the Internet. The topics covered here represent a select sampling of the past few months' on-line discussions. Watch this space in the future for more information from the Internet, or join us on line.

The Internet community's reactions in the wake of NeXT's September 18 new-product announcement were unexpectedly mixed. Everyone agreed that the price was outstanding, but many expressed doubts as to whether or not Motorola could deliver the 68040 chip in quantity for a few months.

In comparison, early in November, Sun announced the 28 MIPS, 4 MFLOPS SPARCstation 2 with a list price of $14,995. Sun's machines were shipping immediately after their introduction date, whereas NeXT's are shipping months after the September announcement. However, the SPARCstation 2's rather poor price/MIPS rating ($535 versus the NeXTstation's price/MIPS of $333) could convince users to postpone their computer purchases until NeXT can begin volume shipments. A borrowed NeXTstation, on loan from NeXT, reportedly came in 4.5 times as fast as the original NeXT computer in PostScript drawing performance and other processor-intensive benchmarks. The comp.sys.next participants think that the NeXTstation may be worth the wait.

Also in November, readers were delighted to hear about Businessland's incredible price discount on old NeXT computers: $2195 for a floor model with 8MB of RAM, a MegaPixel Display, keyboard and mouse, a 40MB swapdisk, and a one-year warranty (optical drives were $600 extra). A Businessland representative confirmed that over 500 systems were being liquidated in order to make room for new NeXTcubes and NeXTstations. Newsgroup readers were elated by this offer; in fact, many who were considering purchasing a NeXTstation abandoned their plans in favor of a Cube at Businessland's discount prices.

Illinois

Chicago NUG
Bill Parod
Northwestern University
627 Dartmouth Place
Evanston, IL 60208
708/491-5368
e-mail: parod@boris.acns.nwu.edu

Massachusetts

Boston Computer Society (BCS) NeXT SIG
Dan Lavin
BCS NeXT Group
One Center Plaza
Boston, MA 02108
617/969-6555
newsletter editor: Michael Burress

Minnesota

Minnesota NUG
Mike Tie
Math and CS Department
Carleton College
One North College Street
Northfield, MN 55057
507/663-4067
e-mail: mtie@carleton.edu

New Mexico

Los Alamos NeXT Users Group
Dwight Barrus
Group C-6, MS-B272
Los Alamos National Laboratory
P.O. Box 1663
Los Alamos, NM 87545
505/667-8870
e-mail: dmb@lanl.gov

New York

GUN (Gotham Users of NeXT)
Tim Reed
Objective Technologies
7 Dey St. #711
New York, NY 10007
212/227-6767
e-mail: treed@object.com
Group e-mail: gun@object.com

Ohio

Columbus NUG
Chuck Dyer
The Ohio State University
1971 Neil Ave.—IRCC
Columbus, OH 43210
614/292-4843
e-mail: dyer-c@osu-20.ircc.ohio-state.edu

Texas

Austin NUG
Lorne Wilson
950 Capitol of Texas Highway N. #300
Austin, TX 78759
512/343-1111
e-mail: pensoft!lorne@cs.utexas.edu

DANG (Dallas Area NeXT Group)
Dirk Hardy
Hofbauer Information Systems
5080 Spectrum Dr., Ste. 912W (Lock Box #21)
Dallas, TX 75248
214/ 385-2991
e-mail: blackbox!kti!root@uunet.UU.net

hAng (Houston Area Next Group)
John R. Glover
E.E. Department
University of Houston
Houston, TX 77204-4793
713/749-1820
e-mail: glover@uh.edu

Washington

University of Washington NUG
Corey Satten
University of Washington
156D Academic Computer Center, HG-45
3737 Brooklyn Avenue, NE
Seattle, WA 98105
206/543-5611
e-mail: corey@cac.washington.edu

INTERNATIONAL

Australia

OzNeXT (Australian NUG)
Paul Davis
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Bond University
Queensland 4229 Australia
075/952 291, 953-3220 fax
e-mail: paul@terrapin.bus.bu.oz.au

Canada

Vancouver NeXT Group
Lionel Tolan
Computing Services
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604/291-4702
e-mail: lionel_tolan@cc.sfu.ca

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poiker@whistler.sfu.ca

Tao, monthly newsletter
Robert Lin, editor
Objective Software
1701W 64th Ave.
Vancouver, B.C.
Canada V6P 2P3
604/261-0186
e-mail: rlin@cs.ubc.ca

Montreal NeXT Section of Club Macintosh
Robert Paulhus
2250 Guy Street, Room 303
Montreal, Quebec
Canada H3H2N2
514/939-0382
e-mail: paulhus@calvin.cs.mcgill.ca

Ottawa NUG
Hugo DeRosier
19 du Muguet
Hull, Quebec
Canada J9A 9Z7
416/236-0609 (NeXT office)
e-mail: phume@next.com

France

French NUG
Thierry Charles
32, Rue de Porto—Cit. Mion
34000 Montpellier
France
33/67-64-07-97
e-mail: 73020.2442@compuserve.com

Japan

NeXus (Japan NeXT User Society)
Katsuhiro Ohashi
4-4-2, Ebara
Shinagawa-ku
Tokyo, 142 JAPAN
Fax: 81-03-351-0880
e-mail: NeXus-office@etl.go.jp
newsletter: NeXus Memo

NeXT SPECIAL INTEREST GROUPS (SIGs)

Classroom
NeXT Courseware SIG
e-mail: send the following text message to
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Frame-mail
FUN (Frame Users Network)
e-mail: framers-request@drd.com

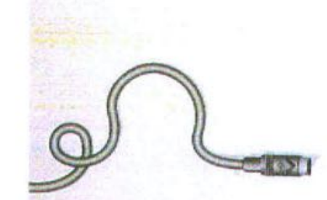
Mathematica
Mathematica Special Interest Group
e-mail: mathgroup-request@yoda.ncsa.uiuc.edu

Medical
NeXTMed SIG
e-mail:NeXTMed-request@ulnar.biostr.washington.edu

Music
NeXT Music SIG
e-mail: next-music-request@usc.edu

Network and Security Management
for Installed Labs and Large Installations
e-mail: next-lab-request@cs.ubc.ca

Programmers
NeXT Programmers SIG
e-mail: next-prog-request@cpac.washington.edu



- In October, some pointed criticism circulated regarding NeXT's decision to unbundle Common Lisp as an included development environment in NeXTstep 2.0. Comments like, "If Common Lisp loses support I have no reason to stay with a NeXT whatsoever," were frequently heard from disgruntled Lisp users. One person, however, did suggest an alternative: "For what it's worth, there is a very good public-domain implementation of Common Lisp available from archive sites on the Internet." Word of this discussion reached a NeXT employee, who told the newsgroup that Allegro Common Lisp will be bundled for all current users, but NeXT was still in the process of negotiating the agreement with Franz for new owners. The questions were answered when a Franz representative announced the company's decision: Allegro CL 3.1 is available from Franz for $1500, but NeXT will distribute a free upgrade to current Release 1.0 customers. Franz will provide limited software support to all Allegro CL users.

- Another point of concern was the new price of optical disks—a considerable increase from $100 to $150. It seems that the price difference is due to the fact that NeXT is no longer heavily discounting their optical disks; in the words of one Cube owner, "$150 per disk is the fair, unsubsidized price for optical media." Of particular concern is that, as of this writing, over 100 companies have entered the magneto-optical disk market, and most are producing drives that use proprietary media formats. Eventually, then, with companies such as Sony (who recently announced a new synthetic plastic that can store 1000 times as much data as traditional optical disks) releasing new products, it's not hard to envision a world in dire need of optical disk standards. That, combined with the industry's increasing reliance on CD-ROM for inexpensive software distribution, makes the future of standardized optical media look dire indeed. It is ironic that original NeXT owners, who bought their computer from the very first company to include an erasable magneto-optical disk (now outdated) in their product line, will be among the first to be victimized by this growing lack of standardization.

  In addition to the optical drive discussion, another topic emerged regarding Maxtor's introduction of a 535MB 3.5-inch hard drive that is even faster than the current 660MB 5.25-inch Maxtor available in the NeXTcube. Connors, too, has a very quick 510MB 3.5-inch drive with a 256KB cache and a 12-millisecond average seek time. The consensus seemed to be that both of these products would be a welcome addition to a NeXTstation.

- Recently, much heated discussion has centered around Lotus's promotional offer involving Improv. This offer promised that Lotus will ship a copy of Improv (a $695 value) to anyone who purchased a 68040-based NeXT computer or 68040 upgrade before the end of the year. In a message posted to the newsgroup, Richard Stallman, author of *Emacs* and the president of the League for Programming Freedom, stated, "Lotus is, of course, the company that has established a monopoly on the spreadsheet commands most users know. Now any independent spreadsheet is required to have new commands that nobody knows and that hardly anybody will want to learn, no matter how good they might be. And, beyond that, [this means] the loss of our freedom to write the programs the users want. These 'free' copies are actually very expensive. Using a Lotus product promotes Lotus, which aids them in denying your freedom. Even if you don't pay for these copies, using their product will encourage other people to buy it."

  A rebuttal to Stallman's post came from a person employed by a large software publisher, maintaining that the creativity and effort employed in designing a user interface should be rewarded with a copyright or patent. Another stated: "Great! We get a product on the NeXT that should help to draw the business world to the machine, and we have people who want to drive them out! Improv should help NeXT sell lots of machines. I'd like to see this happen. More machines will mean more people who want to write software for the machine, and the effect will snowball, the way it did on the PC and the Mac." Another opinion came from a different software engineer, who claims that patents are legal monopolies granted by the government, and that these monopolies must serve the interests of the public. Since the resources invested by the users of a spreadsheet dwarf the resources invested by the developer, he argues that Lotus's monopoly does not serve the public and should not be protected in this fashion.

Dan Lavin *is technology editor of* NeXTWORLD.
Declan McCollough *is a student at Rutgers and a frequent contributor to comp.sys.next.*

NeXTworking

Your First Time

by Daniel Miles Kehoe and Seth Ross

You won't tap a NeXT computer's full potential until you've tied together a NeXT network and put "interpersonal computing" to work in your organization. The tools for enterprise-wide computing are available on each NeXT computer, in the form of network-ready hardware, plus software that simplifies the task of network administration. This article will show you how you can pull your NeXT computers out of boxes in the morning and by 5 p.m. have a working network of interpersonal computers. You'll need to steer around a few sandbars, but the route is navigable, and this article will chart the course.

Getting interpersonal. A bunch of NeXT computers can be considered a networking kit, one that includes Ethernet connectors on every motherboard and a folder stocked with utility applications. All the tools are there, but users are well advised to note that "some assembly will be required." Imagine an instruction sheet that looks something like the top table on page 86. The first three steps lay the groundwork (planning ahead, cabling, setting up files), the middle steps actually establish the network, and the final steps (adding user accounts, setting up mail and printers) make the network useful.

Here's sandbar number one: If you don't read the NeXT documentation thoroughly, you'll quickly run aground. The NeXT *Network and System Administration* manual describes each step of setting up a simple network. NeXT's technical support will tell you that many people would have fewer problems if they spent more preparation time with the manual. Ironically, it's the jaunty UNIX wizards who most often founder in this trap.

Another necessary first step is planning. You'll need to develop a site plan that details what goes where. Map out a network organizational chart that shows which users will have access to what network resources. And while you're planning ahead, make sure you can reach an expert. Ask for help, should you need it, from a local user group, a moonlighting university NeXT consultant, your local NeXT systems engineer, a retailer representative, or NeXT's technical support.

While you're planning, you might wonder what to do with the PCs, Macs, UNIX workstations, minicomputers, and mainframes that are already in use in your organization. Don't attempt to incorporate them into your plan if you've never set up a NeXT network before. Heterogeneous networks are difficult to set up, mostly because of the hodgepodge of add-on networking hardware and software required by the other platforms. Future issues of *NeXTWORLD* will untwist the knot of multivendor connectivity. For now, focus on the needs of a small workgroup of 2 to 15 coworkers and their NeXT computers. The departmental workgroup is the building block of any network, and you'll find it easiest to start with a simple NeXT network.

Making a network. The idea of a network is simple: Computers connected to each other. In practice, a network is woven together at many levels, some physical, some abstract. NeXT networking makes it possible to ignore most of these levels. All NeXT computers use the Ethernet standard, which allows the computers to communicate at the level of electrical signals, and TCP/IP (Transmission Control Protocol/Internet Protocol). TCP/IP conforms the electrical signals to a data standard that is common to each computer. It's sufficient to know that if hardware or software supports Ethernet or TCP/IP, it'll work with the NeXT.

From the vantage point of most system administrators, a network is composed of configuration files that reside on each computer and store information about the role of each computer and its relationship to others on the network. NeXT administers systems by a different method, controlled by the NetInfo utility, which exists in a database on a designated central computer, the "configuration server."

Every NeXT network requires three essential "servers": The configuration server controls the network, the Network File System (NFS) server manages files, and a mail server manages electronic mail. For flexibility's sake, these three software machines can run on either different computers or a single computer. To keep things simple, use a single computer. Note that NeXT recommends that the configuration server have at least 12MB of RAM and a 330MB hard disk drive. For archiving files, this would be the best place for an optional optical disk drive.

While you are planning, don't forget people, the essential participants in the network. You need someone to be responsible for administering the network, you must consider the security of your network, and you'll want to recognize that the way people work will change once the network is in place.

Getting your hands dirty. You can't avoid step 2, cabling. If you're only connecting a few computers in one contiguous location, do it yourself. That part really is as easy as plugging in a phone. If you're networking an entire office floor, hire an electrician who specializes in voice/data cabling to ensure that the work conforms to local building codes.

The hardware requirements for a basic network are summarized in the lower table on page 86. You have two choices for NeXT cabling: twisted-pair (which may be the telephone wire already installed in your office) or coaxial cable. In either case, all the hardware you need is available at electronics supply stores or from NeXT.

Setting up the network files. Don't expect that just because you've connected the cables to the computers the network is ready to work. There is more to a network than cables—and there are more sandbars ahead.

Before you get to step 3, setting up network files, take one simple, but undocumented, precaution. If any of your coworkers have already set up NeXT computers as stand-alone workstations, you must use the UserManager utility to make a list of the user IDs that are in use. Later, when you set up new network-wide user accounts, you'll check this list to be certain you don't use the same numbers.

Now set up the files. Put the LocalApps and LocalLibrary folders on the computer that will be the NFS server; these folders will store applications and literature that all users will share. You'll also need a folder named Users, and perhaps one named Projects for archiving collaborative work. The NeXT documentation does not suggest it, but you'll have an easier time if you set up these folders before you begin configuring your network.

Creating a NeXT Network, Step by Step

Steps	Tools and Supplies	Time
1. Plan ahead	NeXT documentation Site plan Network organizational chart	1–2 days
2. Lay cable	Either coaxial or twisted-pair cable. (You may need a qualified electrician for building work.)	1–2 days
3. Set up network files on server	Workspace Manager application	<1 hour
4. Turn computer into configuration server	NetManager application	<1 hour
5. Add host computers	Terminators and T-connectors (if installing thin Ethernet) and NetManager application	1–3 hours
6. Export and mount files from Network File System server	NetInfoManager application, Edit	2–5 hours
7. Add network-wide user accounts	UserManager application	1–3 hours
8. Run mail and printer utilities	MailManager, Edit, PrintManager	<1 hour

Hardware Requirements for Thin Ethernet and 10BaseT Networks

	Thin Ethernet	10BaseT Ethernet
Cable specifications	Coaxial RG58/U	Twisted-pair (many types acceptable)
Topology	Linear (computer to computer)	Star (wiring block at center)
Maximum length of cable	300m (total) without accessories; 1000m with repeaters	100m (computer to wiring block) without accessories; unlimited with repeaters or concentrators, but 185m between concentrators linked with thin Ethernet
Additional hardware	Two 50-ohm coaxial cable terminators (one at each end of network); one BNC T-connector for each computer	None

Setting up the configuration server. NeXT provides a suite of easy-to-use applications that unlock the system files that administer the network. The key software tools that set up a NeXT network are the "manager" applications that live in the NextAdmin folder. You'll use the NetManager application in step 4: It establishes the configuration server. Later you'll use NetInfoManager, MailManager, and PrintManager.

Before you proceed to step 4, consider saving important files and rebuilding the hard disk on the computer that will be the configuration server; it is not strictly necessary, but starting with a clean slate ensures that no preexisting disk glitches will hang you up later.

Figure 1 shows NetManager's main panel, as you'll see it when you follow the procedure described in the NeXT *Network and System Administration* manual. NetManager asks you to assign a name to the configuration server computer. The convention is to give it the name of your company or department (in Figure 1 the assigned name is "fortuity"). If you plan to connect to a global network such as the academic community's Internet, this name will form part of your e-mail address, so make it descriptive (future *NeXTWORLD* articles will explain how to join global networks). If, however, you are setting up a simple, self-contained NeXT network, you can just use NetManager's default settings.

One click of the OK button, and NetManager's magic turns your computer into a configuration server.

Connecting the hosts. Now proceed with step 5, connecting your coworkers' computers, called the "host" computers. You don't need to power off the computers to make the connections. Be sure you use 50-ohm (not 75-ohm) BNC terminators at each end of the network if you are using coaxial cable (thin Ethernet).

After your coworkers' computers are physically connected, you must restart the configuration server and again launch NetManager to enable "automatic host addition." This ensures that each computer on the network is automatically assigned an Internet address. If you are setting up a network from scratch, you can simply accept NetManager's defaults. There is a potential for conflict if any computer on the network has previously been used on a network where automatic host addition was disabled by a system administrator, but it's ordinarily clear sailing.

This is where you'll see NeXT networking at its easiest. To add a new computer to the network, you simply connect the computer and power it up! Every NeXT computer searches to see if it is connected to a network when it boots up. The first time it finds a network connection, it asks the user to assign a "hostname" that will identify the user's computer on the network. After that, it is forevermore a networked computer.

To appreciate the magic of the procedure you have just completed, consider that traditional UNIX networks require each computer on the network to be equipped with a full set of network-configuration system files. Every time the system changes, the network system administrator must log on to each computer and edit the system files. In contrast, NeXT networks store all the system configuration data in one spot: the configuration server in the NetInfo database, the true home of a NeXT network.

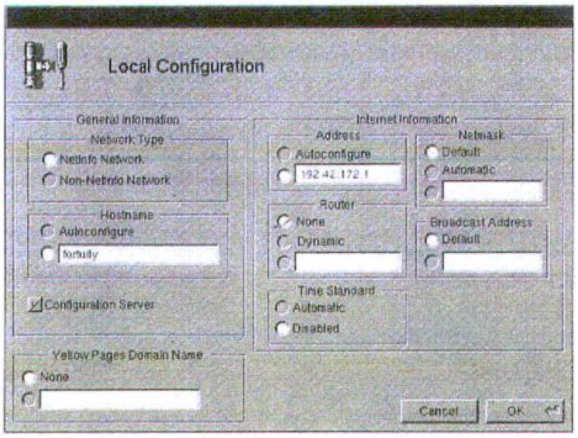
Setting up the NFS server. The purpose of a network is the sharing of files—also the purpose of step 6, in which you'll make files in the LocalApps, LocalLibrary, Projects, and Users folders accessible to everyone on the network. These folders must be exported from the file server and mounted on each host computer by the NetInfo service. Under NeXTstep 2.0, the main tool for this job is NetInfoManager, which sets up the NFS server to do this job.

Before you break out NetInfoManager, use Edit to open the file /etc/exports.example. Add # to the existing lines to turn them into comments, and add these lines to the end:

```
/Users -anon=0
/Projects -anon=0
/LocalLibrary -anon=0
/LocalApps -anon=0
/usr/spool/mail -anon=0
```

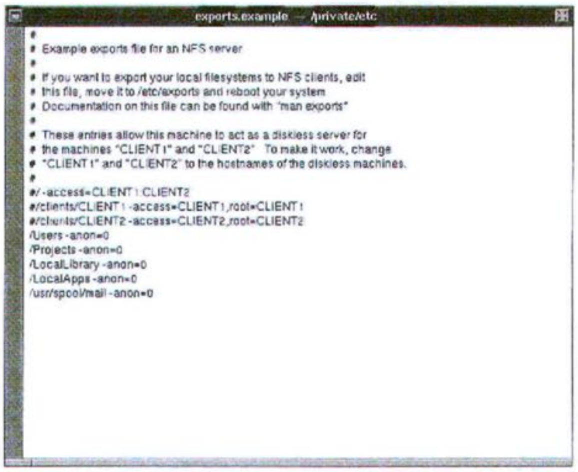
(the resulting file should look like Figure 2). Type the lines carefully (don't overlook the hyphens), and save the file as /etc/exports. This file controls which folders are exported across the network.

After you have created an /etc/exports file, you are ready to use NetInfoManager to modify the NetInfo database. This is not a trivial task; follow the instructions in the NeXT *Network and System Administration* manual carefully. NetInfoManager is a can opener, not a Cuisinart. With NetInfoManager, a user can investigate every aspect of the underlying NetInfo database, and,


Local Configuration
General Information
Network Type
NetInfo Network
Non-NetInfo Network
Hostname
Autoconfigure
Internet Information
Address
Autoconfigure
Netmask
Default
Automatic
Router
None
Dynamic
Broadcast Address
Default
Time Standard
Automatic
Disabled
Yellow Pages Domain Name
None
Cancel
OK

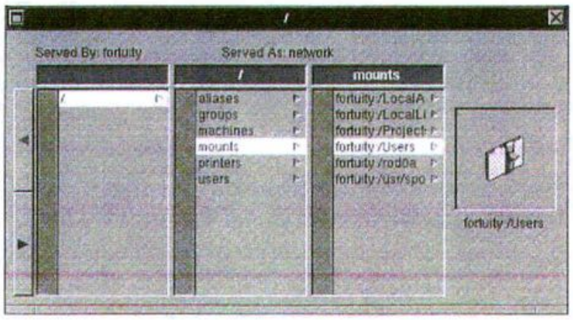
Address: 192.42.172.1
Hostname: fortuity
☑ Configuration Server

Figure 1. Checking the Configuration Server box on this panel allows other machines on the network to use this machine (the server) as a home base. Be careful: This step is very difficult to reverse.


exports.example — /private/etc

```
#
# Example exports file for an NFS server
#
# If you want to export your local filesystems to NFS clients, edit
# this file, move it to /etc/exports and reboot your system
# Documentation on this file can be found with "man exports"
#
# These entries allow this machine to act as a diskless server for
# the machines "CLIENT1" and "CLIENT2"  To make it work, change
# "CLIENT1" and "CLIENT2" to the hostnames of the diskless machines.
#
#/ -access=CLIENT1:CLIENT2
#/clients/CLIENT1 -access=CLIENT1,root=CLIENT1
#/clients/CLIENT2 -access=CLIENT2,root=CLIENT2
/Users -anon=0
/Projects -anon=0
/LocalLibrary -anon=0
/LocalApps -anon=0
/usr/spool/mail -anon=0
```

Figure 2. This simple ASCII file declares which directories or file systems will be exported (made available to others) at boot time. This file was made by modifying the /etc/exports.example file. Lines starting with # are treated as comments and are ignored.


Served By: fortuity
Served As: network

/
/
aliases
groups
machines
mounts
printers
users
mounts
fortuity:/LocalA
fortuity:/LocalLi
fortuity:/Project
fortuity:/Users
fortuity:/rod0a
fortuity:/usr/spo
fortuity:/Users

Figure 3. NetInfoManager provides access to all properties of a given domain, in this case the root domain. Everyone on the network has access to the files mounted in this domain.

given super-user privileges, change any attribute. But for all its power, NetInfoManager is no help when it comes to showing the novice how to set up a file server.

Getting a grip on some basic concepts will help you maintain balance despite the coming rapids. You should know that NetInfoManager manipulates logical categories that exist as network services, invisible to the user. A NetInfo database is built of "domains," purely conceptual contrivances that group information about users, machines, and resources. Domains are hierarchically organized like file directories. The top level, or parent, is the root domain, which could represent an entire organization, while child domains represent departments within the organization, down to the level of a workgroup or a single machine. For a simple network, you will need only the root domain.

Your first step is to use NetInfoManager to open the root domain. Figure 3 shows an opened NetInfo root domain (/). It looks like a folder with files, but it isn't. Within each domain, the NetInfo database is organized into "directories," which, however, are no relation to directories in the UNIX file system. Each directory contains "properties," which are associated with one or more "values." Follow the documentation to add new directories, create properties, add values, and change values. Do this for each folder you want to make available to the network. Be warned: The documentation shows only how to mount the Users folder. You must use the same procedure to mount LocalLibrary, LocalApps, Projects, and /usr/spool/mail.

Adding network-wide user accounts. To continue to step 7, restart the configuration server, then all your coworkers' computers. You'll see the network appear—shared folders will appear in the Net folder of every computer.

Now you need to give each coworker a new account. UserManager will be a breeze after your bout with NetInfoManager. You'll run into problems only if users have already set up local accounts on stand-alone machines. If they have, they will have already used a few of UserManager's default user IDs.

To find out what numbers to avoid, check the list of IDs in the UserManager utility you made when you started. As an extra precaution, it's best to assign the network-wide user IDs in a new series—if the default is 21, change it to 41. Also, be sure to refuse the default that UserManager suggests for a home directory. You must change this to the path for the NFS server's User folder, in the form /Net/*servername*/Users/*acctname*. UserManager will automatically create this home directory if you have not already done so. Have your coworkers copy any files they need into their new home directories.

Electronic mail and printers. The MailManager must be the simplest of all NeXT applications. There's one button to click after starting up the application on the configuration server; there's one button to click after starting up the application on each of the networked computers. Mail is then ready to fly, except for one problem: MailManager adds two lines to the /etc/exports file on the configuration server, which creates conflicts with the existing /LocalLibrary and /usr/spool/mail lines. Open up /etc/exports with Edit, and remove the new lines (the file should again look like Figure 2). You've just navigated past the last obstacle. As soon as you've exported printers, your network will start pulsing. And setting up your printer is easy. Use PrintManager in the NextApps folder. With a click of the mouse a local printer is made available for network use.

Comparative networking. With the NeXT system administration manuals and the tips we've given you, you should have no problem building a network, though you probably won't call it an easy job. How does it compare to building a network with Apple Macintoshes, with PCs, or with traditional UNIX workstations?

Look at the Mac first. A simple AppleShare network based on Apple LocalTalk communication is the prototype of plug-and-play networking. Printers plug in, and a Chooser application finds them. The same Chooser finds file servers and mounts them for file access. Networking software is set up with a simple Installer application. But with this ease of use comes inflexibility. For example, UNIX allows a single directory to contain files located on physically separate servers (for instance, the directory "Company Correspondence" may include files from a dozen computers). Apple's file system accommodates only physical devices such as hard drives, unlike UNIX, which allows symbolic links to be established between folders. The AppleShare approach is fine for simple networks but cannot be easily customized for enterprise-wide computing.

PC networks are harder to classify, since they come in so many flavors. All require batch files that configure each machine—and ensure the job security of network administrators. The most popular, Novell's NetWare operating system, is widely used for small departmental networks, but it resists consolidation into hierarchical, enterprise-wide networks. Two networks cannot be joined without reconfiguring each.

Even among Novell partisans, UNIX is widely used for larger, enterprise-wide networks, particularly because unattended computer-to-computer communication is bundled in all UNIX systems. But traditional UNIX systems require full-time administrators who can "grep," "awk," and "sed" their way through system files on every host.

Sun workstations are the closest relatives of NeXT computers. The flexibility of Sun and NeXT networks is similar, and in fact, Sun's network management service is a direct ancestor of NeXT's NetInfo scheme. Like NetInfo, Sun's system relies on system files residing on one central computer, but unlike NetInfo, the Sun scheme offers no network management applications that a novice can touch. And unlike with NetInfo, systems built with the Sun tool cannot be dynamically and hierarchically stacked to build enterprise-wide networks.

Seen against this panoply of networking schemes, NeXT wins honors if not fanfare. NeXT networking is as powerful and flexible as other UNIX systems but vastly easier for the novice to manage. An "NFSManager" or "SharedFileManager" that replaces the cryptic NetInfoManager with a bullet-proof, prompted interface for exporting and mounting files would make NeXT networking truly plug-and-play.

If you are setting up a simple NeXT-only network, with cabling in place, you can be up and running in less than a day. The caveat is simple: The process requires many steps, and one false move will send you hurtling toward tech support. Don't let that stop you from trying, even if you have had no networking experience. It can be done, and the benefits of NeXT networking are worth the efforts. ⌽

Daniel Miles Kehoe *and* **Seth Ross** *are authors of a book,* New to NeXT, *to be published this spring.*

NeXT Question

Edited by Bruce Blumberg and Eric Larson

Welcome to NeXT Question. In this department we will provide answers to your questions about the NeXT and provide helpful hints and tips. We will cover NeXTstep, UNIX, and third-party products. Who are we? Well, the entire NeXT support organization will back this department, but in the lead are Eric Larson and Bruce Blumberg. Bruce Blumberg was the first employee the founders hired. He was involved in many of the fundamental design decisions regarding the machine and its software. Eric Larson is a member of NeXT's customer support group.

NeXT Question is divided into two sections: questions for the general user and questions for NeXT developers and administrators.

Since, for obvious reasons, we've had no reader questions so far, here are a few from our archives, from the NeXT publication NeXT Answers, and from asking around. We want future columns to represent NeXTWORLD readers' concerns. So please, direct any questions to NeXT Question, NeXTWORLD, 501 2nd Street, San Francisco, CA 94107, or nextwrld!dlavin@uunet.uu.net.

FOR USERS

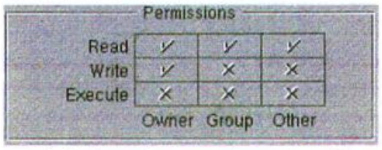
Q. Do I have to use NeXT-supplied cables with my computer?

A. Yes. The MegaPixel Display cable carries keyboard, sound, and video information, as well as power. To keep the physical complexity in the monitor to a minimum, the signals to the monitor are timed specifically for this cable. The printer cable carries special signals to turn the printer on and off. Both cables are highly specialized; generic cables won't do the trick.

Q. How do I keep the other people using my NeXT from browsing through my files?

A. This question has to do with the issue of file ownership and permissions. There are three different types of access. Users with "read" permission can look at a file or directory, open directories, and copy files and directories. "Execute" permission is given to the "owners" of files, which allows users to run a program. Users with "write" access can write to a file or directory, or even wipe it out.

To examine or change the permissions on a file or directory in System 2.0 (which everyone should be running soon) choose the file or directory in the File Viewer, then choose Inspector from the Workspace Tools menu. The Attributes section of the Inspector panel includes a grid, labeled Permissions, with various boxes you can check, representing three types of users (owner, group, other), with three possible types of access (read, write, and execute). The owner (usually yourself) is also named in the panel. A group is made up of users with the same access privileges, as set up by the system administrator; one user can be a member of several groups. "Others" includes the rest of the world.



Permissions

	Owner	Group	Other
Read	✓	✓	✓
Write	✓	×	×
Execute	×	×	×

A check mark means that a class of users has that access, an "x" means they don't. Click directly on the box in question to change a check mark to an x or vice-versa. Click OK to make the changes permanent. If you change the read permission for a group to an x, that group will not be able to browse your files. If you change the write permission to an x, that group will not be able to change the file.

Q. Can I use third-party memory in my NeXT?

A. In the NeXTcube and NeXTstation, Mac memory will work. Use an 8-data bit, no parity, 100 ns memory or faster. (Be warned, however, that NeXT will not supply technical support for memory provided by a source other than NeXT.) Memory for the NeXTstation Color and NeXTdimension is available only from NeXT.

Q. I need more space on the display. Can I make the dock go away?

A. Grab the NeXT logo at the top of the screen and drag it down. You can make all but the NeXT logo disappear. To get the dock back, simply drag the logo back up. Double-clicking on the logo, by the way, makes the workspace active.

Q. I've run out of space on the dock. I would like more slots because I use so many applications regularly.

A. There is an excellent freeware program by Jayson Adams called AltDock. It creates a second dock elsewhere on your screen. Now in version 2.0, it is available from public access sites on the Internet and is probably available from your local user group. (See The NeXT World in this issue for a complete list of NeXT user groups.)

Q. What SCSI hard drives can I use with my NeXT?

A: NeXT provides a range of drives from 105MB to over 1GB in storage capacity. NeXT has carefully qualified these drives for connection to your computer. To use a third-party drive, the following must, in most cases, be true. First, you must be running System 2.0. Second, you must be using the proper cable (50-pin SCSI-type on the new machines). Third, your drive must support the SCSI commands Inquiry and Read Capacity. It must be running SCSI rev 12b or later, and it must support 10 bytes of Read/Write command blocks. Contact the drive manufacturer to find out whether a drive supports these specifications.

Q. How do I eliminate that last header and footer line in WriteNow to jam more onto my page? I've tried everything.

A. You haven't tried rewriting WriteNow from the source code. Unfortunately, these lines cannot be removed.

Q. How do I keep a copy of the mail that I send?

A. You have two options. You can put your own name in the send window under cc:. New in NeXTstep 2.0, however, is the option of archiving all your outgoing messages. Simply go to Preferences under Info . . . in the Mail menu and check archive.

Q: What are the standard cable, BNC connectors, and terminators for the NeXT's thin Ethernet?

A: You need RG58A cable. It operates at 50 Ohms. Don't use RG59 (75 Ohms) or RG62 (90 Ohms) cable. The BNC connectors and terminators must also be 50 Ohms. Don't use the ones for cable television—they're at 75 Ohms. Note that each machine needs to be connected to the net with a T-connector, including the machines at the end of the Ethernet, and the machines at both ends have to be terminated. The '040 machines support twisted-pair, which we'll discuss later.

Q: I have an optical disk that continually spins up and spins down. What can I do?

A: Dust can contaminate an optical disk. For the long term, NeXT is shipping a retrofit kit with every hardware upgrade to solve this problem.

For the present, cleaning a dusty optical disk isn't difficult. You should use a soft lens-cleaning tissue (available at any photo supply store). Hold the gate open on the disk case and look at the shiny side of the optical disk. With the tissue, *gently* wipe the disk from the center outwards, toward the edge. Rotate the disk and repeat the process until you've cleaned off the entire disk.

Q: I am interested in becoming a NeXT developer. Where do I go for information?

A: Information can be obtained by calling our hotline in California at 800/848-NeXT and giving them your name and address.

Q: I am interested in NeXT product information, but there is no local NeXT dealer or representative. Who should I talk to?

A: See the previous answer. Use the same phone number.

Q: Where can I learn more about object-oriented programming?

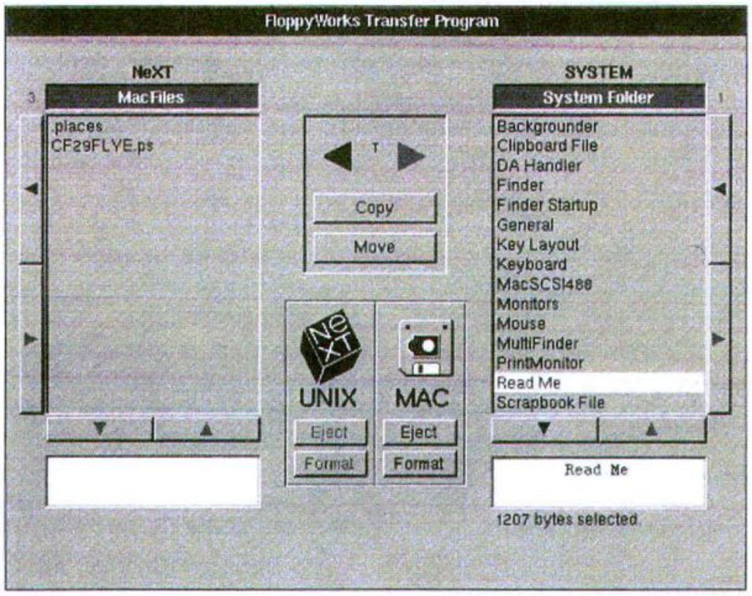
A. Here is a list of books, compiled by Edward J. Berard, of Berard Software Engineering:

Cox, B. J. *Object Oriented Programming: An Evolutionary Approach*. Reading, Mass.: Addison-Wesley, 1986.

Goldberg, A., and D. Robson, *Smalltalk-80: The Language and Its Implementation*. Reading, Mass.: Addison-Wesley, 1983.

Stroustrup, B. *The C++ Programming Language*. Reading, Mass.: Addison-Wesley, 1986.

Software for the NeXT™ That Links You to the Macintosh™ and Other Desktop Computers



1207 bytes selected.

Introducing FloppyWorks™

FloppyWorks™ is the only file transfer software for NeXT™ computers that can format, read, and write Macintosh™ (1.44 MB), NeXT, MS-DOS™, and OS/2™ (720 k, 1.44 MB, 2.88 MB) floppy disks and can be used with either of NeXT's software versions 1.0 or 2.0.

FloppyWorks software makes performing transfers quick and easy. The files on the hard disk and floppy disk are shown next to each other in two browsers. An intuitive user interface saves time by increasing the efficiency of the file transfer process, and file transfer filters provide a simple means of translating data among different word processing, spreadsheet, database, and graphic formats. FloppyWorks transfers a wide variety of files.

And, FloppyWorks can be used with the new NeXT 2.88 MB internal floppy drive, PLI's SuperFloppy 2.8™ and our newest external floppy drives, ***CubeFloppy 2.9®*** and ***CubeFloppy Plus®***.

CubeFloppy 2.9 is 100% compatible with the NeXT's new 2.88 MB internal drive and reads and writes 720 k, 1.44 MB, and 2.88 MB disks.

Introducing CubeFloppy Plus

CubeFloppy Plus is our new SCSI floppy disk drive that will format, read, and write Macintosh 400 k, 800 k, and 1.44 MB floppy disks (does not support 2.88 MB disks) as well as MS-DOS and NeXT disks. This drive is designed specifically for NeXT users who need access to low density Macintosh disks such as those made by the Macintosh Plus.

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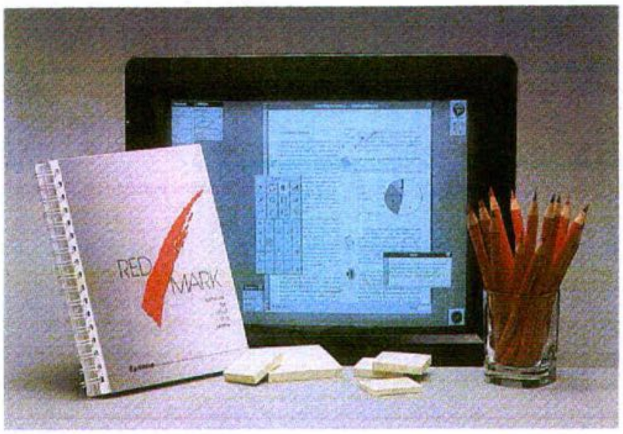
Circle 10 on reader service card

Product Showcase

Turn here every issue for the latest-breaking, most interesting products in the NeXT marketplace. This is an exciting time for NeXT users. Development is exploding. The NeXTstep environment is proving to be a spawning ground for unique products. These ads keep you abreast of the best of what's out there. Showcase ads provide you with concise, easy-to-use information. Every one includes a picture, product information, and a handy reader service number. All this in 1,075 words (picture = 1,000 words + 75 text.) This is the first issue of *NeXTWORLD* and our first six showcases. Watch this space. It's gonna be fun.

Review and proof on line . . .



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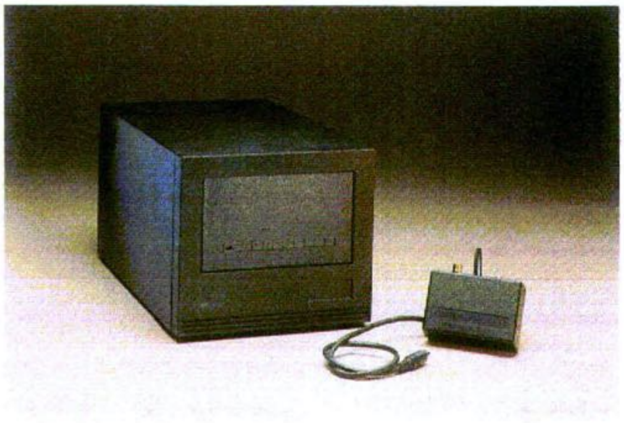

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Also: Inexpensive telecomm hardware to connect the NeXT to a phone line for voice mail, FAX, modem. Call for info.

1-800-CUBE-RTE

The Cube Route, Inc. /430 Broadway/Cambridge, MA 02138/(800) 282-3783

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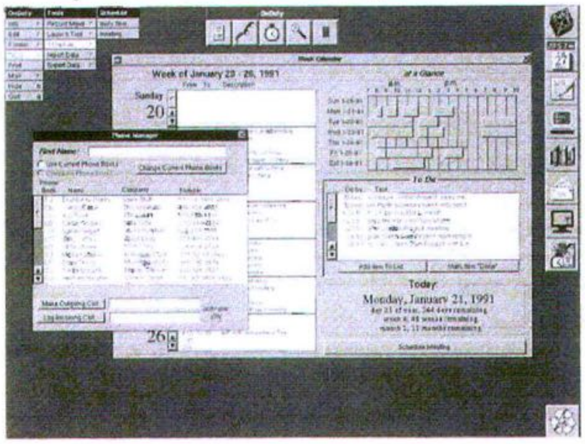

Organize, prioritize, and categorize important information that comes across your desk. With OnDuty you can schedule time commitments with the Appointment Book. The Contact Manager lets you track leads, customers, and other contacts. Includes a Phone Manager for automatic dialing of your listed phone numbers. The Notepad lets you jot down and organize random ideas. Pocket, Financial, and Programmers Calculators provide full range of functions. Affordable price at $295.00.

Digital Instrumentation Technology, Inc./901 18th St., #11000/Los Alamos, NM 87544/(505) 662-1459

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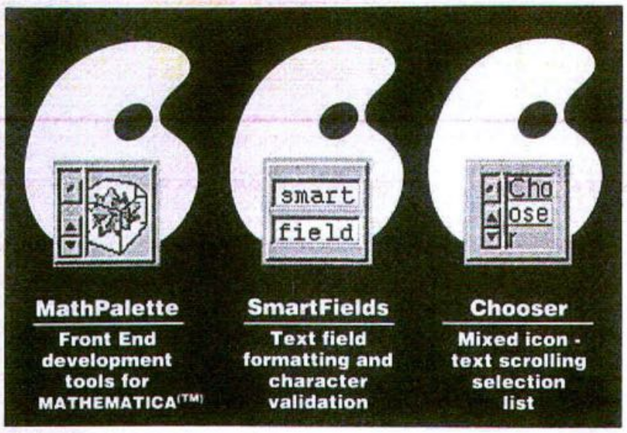
The NeXT Palettes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Call Objective Technologies today for more information about the most innovative palettes ever created for NeXT. Increase your development power. Save money by reducing your development time using objects created by the only commercial developers of custom palettes for NeXT's Interface Builder.

Mathematica is a trademark of Wolfram Research, Inc.

Objective Technologies, Inc./7 Dey St., #711/New York, NY 10007/(212) 227-6767

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Time Management Software

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SOFTWARE

- Stained Glass Software presents Calendoscope™ – time management software for individuals and groups.
- Features: Day, Week, Month and Year views. Easy propagation. Collective Calendar for group support. Sound/panel/email notification. Text and voice attachments. Low cost. Send blank optical or floppy disk for free sample.
- Stained Glass Software also provides consulting services for NeXT program design, implementaion and porting.

Stained Glass Software/1173 Kent Ave./Sunnyvale, CA 94087/(408) 249-3337
Fax (408) 249-5312

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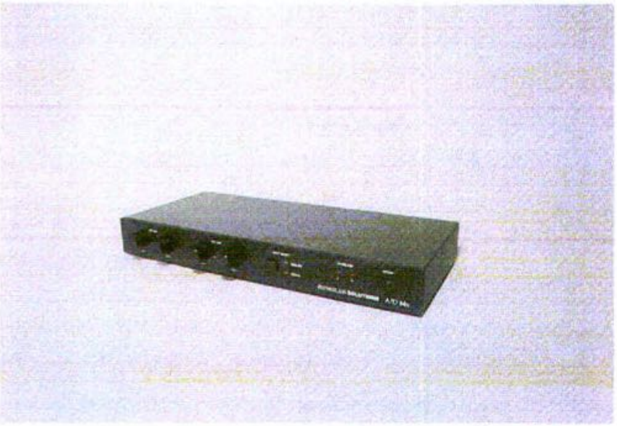
A/D64x A/D Converter



Hardware and software for high-quality sound recording and data capture on NeXT computers. Two-channel 16-bit delta-sigma conversion, 64 times oversampling, self-calibration, mic preamp with phantom power, balanced and unbalanced inputs. 32, 44.1, and 48 KHz (plus external) sampling rates. Multi-A/D64x synchronization. Digital (AES/EBU) input and output. NeXT software for recording, control, and editing. Stand-alone operation – replacement DAT recorder front-end, etc. Now shipping. $1295.

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Dock Soup

Dock Soup is a complete guide to third-party products available for the NeXT computer as of January 1991, according to the latest information available at press time.

The products reviewed in *NeXTWORLD* include the *NeXTWORLD* rating. For a description of the *NeXTWORLD* rating system, see Page 66 of this issue. For more information on any of the products listed here, call the manufacturer.

Peripherals

Abaton Scan 300/GS

An 8-bit flatbed scanner that scans at resolutions of up to 300 dots per inch for line art, halftones, and 256 levels of grayscale. Saves files in TIFF format and will print to NeXT, Macintosh, IBM PC, and PS/2 computers.

$1598 for 300 GS engine, $595 for interface kit. Abaton, 48431 Milmont Dr., Fremont, CA 94538. 800/444-5321, 415/683-2870 fax

A/D64x

An analog/digital interface for high-quality sound recording and data capture. Offers two channels of 16-bit, delta-sigma conversion, a microphone preamp with phantom power, and independent digital AES/EBU input and output.

$1295. Singular Solutions, 959 E. Colorado Blvd., Pasadena, CA 91106. 818/792-9567, 818/792-0903 fax

Ariel QuintProcessor

A signal- and array-processing system that uses five digital signal processors to enhance the speed and versatility of the NeXT Music Kit. Can be used for array processing, music synthesis, speech recognition, and digital audio recording and mixing.

$6995. Ariel Corporation, 433 River Rd., Highland Park, NJ 08904. 201/249-2900, 201/249-2123 fax

Cube Floppy 2.9

An external SCSI 3.5-inch floppy disk drive that reads and writes to 3.5-inch disks used by computers with MS-DOS, Macintosh, and UNIX operating systems.

$250 for floppy works; $520 for Cube floppy; $680 for package with software. Digital Instrumentation Technology, 901 18th St. #11000, Los Alamos, NM 87544. 505/662-1459, 505/662-0099 fax

DaynaFILE

An external floppy disk drive that enables NeXT computers to read and write to 5.25-inch, 1.2MB disks and 3.5-inch, 1.44MB disks. The DaynaDOS file transfer application permits NeXT, DOS, and Macintosh files to cohabit inside the NeXT file system and be opened and edited using various compatible NeXT applications.

Starts at $750. Dayna Communications, 50 S. Main St. Fifth Floor, Salt Lake City, UT 84144. 801/531-0600

Dazzl Model 16/12 Analog to Digital Converter

An analog-to-digital input board that acquires data on 16 single-ended or 8 differential channels. Reads data in ASCII or binary form and imports into a variety of applications, including medical monitoring, physiological potential recording, robotics, and analytical data acquisition. Sampling is done before, after, or around a trigger.

For price contact Dazzl. Dazzl, 1203 N. Bourland Ave., Peoria, IL 61606. 309/674-9317

Digital Ears

A hardware/software package for entering, recording, and manipulating CD-quality sound and high-resolution laboratory data. Can be used for computer-based training, education, presentations, digital audio recording, voice therapy and diagnosis, speech and voice recognition, and acoustic research.

$795. Metaresearch, 516 S.E. Morrison, Ste. M-1, Portland, OR 97214. 503/238-5728, 503/230-2627 fax

Digital Eye

A hardware/software package for entering and recording still and moving NTSC video images from many sources, including laserdisc players, video and still-video cameras, and VCRs. Features variable image size and resolution selections and software controls for image enhancement.

$975. Metaresearch, 516 S.E. Morrison, Ste. M-1, Portland, OR 97214. 503/238-5728, 503/230-2627 fax

DM-N Ariel Digital Microphone

A microphone with preamps and two 16-bit analog-to-digital converters that are compatible with all existing software making use of the NeXT DSP port. Miniphone input jacks accept external signals from audio sources like CD players and FM receivers, as well as other industrial-control instruments.

$595. Ariel Corporation, 433 River Rd., Highland Park, NJ 08904. 201/249-2900, 201/249-2123 fax

Epoch-1 InfiniteStorage Server

An application- and platform-independent network server that communicates with heterogeneous computer networks. Equipped with fast magnetic disks that serve as a virtual cache while data is "staged" on and off to optical disk. Performs automatic, unattended on-line and remote system backup across a network.

$82,900 to $694,000. Epoch Systems, 8 Technology Dr., Westborough, MA 01581. 508/836-4711, 800/US-EPOCH, 508/836-3802 fax

Extron Board

A board that allows NeXT computers to display video on a variety of compatible, large-screen data projectors or monitors.

$2500. Extron Electronics, 13554 Larwin Cir., Santa Fe Springs, CA 90670. 213/802-8804, 800/633-9876, 213/802-2741 fax

Extron RGB 111

A computer-to-monitor interface that provides simultaneous local monitor viewing and an equally clear display on a compatible monitor or projector.

$370. Extron Electronics, 13554 Larwin Cir., Santa Fe Springs, CA 90670. 213/802-8804, 800/633-9876, 213/802-2741 fax

IX-30F Image Scanner

An 8-bit flatbed scanner with a scanning resolution of up to 300 dots per inch and 4, 16, or 256 levels of grayscale. Saves images in EPS or TIFF formats with compression options. Has an automatic document feeder (ADF) option for OCR applications.

$1545; $595 for ADF. Canon U.S.A., One Canon Plaza, Lake Success, NY 11042. 800/848-4123

JETSTREAM Tape Backup System

A backup program that uses standard 8mm removable and rewritable videotape cartridges. Archives up to 2.3 gigabytes of data per tape at speeds up to 14.4MB per minute. Error correction code ensures data integrity.

$5995. Personal Computer Peripherals Corporation, 4710 Eisenhower Blvd., Bldg. A4, Tampa, FL 33634. 813/884-3092

LaSTLock

A hardware security system for the NeXTcube. Protects the monitor, keyboard, mouse, and Cube from tampering and theft. Attaches to a NeXTcube without bolts, screws, or glue.

$195. Prevail, 3490 The Alameda, Santa Clara, CA 95050. 408/296-6550

OcéColor

A color thermal transfer printer capable of monochrome, 3-color, and 4-color printing using a wax-based ink ribbon. Outputs at 300 x 300 dots per inch. Comes with Pantone color simulations and 5MB RAM.

$8990. OcéGraphics, 385 Ravendale Dr., P.O. Box 7169, Mountain View, CA 94039. 415/964-7900, 800/545-5445, 415/961-6152 fax

PLI SuperFloppy 2.8

A floppy disk drive that uses vertical recording to increase the capacity available in most disk drives from 1.44MB to 2.88MB. Compatible with 720KB and 1.44MB disk standards, allowing users to work with files from MS-DOS, OS/2, or UNIX-based systems.

$499. Peripheral Land, 47421 Bayside Pkwy., Fremont, CA 94538. 415/657-2211, 800/288-8754, 415/683-9713 fax

PM1.44

An external 3.5-inch SCSI floppy disk drive that reads compatible file formats from IBM, DOS, and Macintosh computers. Can be stacked on top of the Cube.

$849. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628-DISK, 415/948-6296 fax

PMHDE

An external SCSI hard disk drive enclosure that accommodates 3.5-inch or 5.25-inch hard disks. Provides additional external disk storage of up to 7 gigabytes. Can be stacked on top of the Cube or mounted in a rack.

$695. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628- DISK, 415/948-6296 fax

Scan-X Professional

An 8-bit scanner that scans at resolutions of up to 1500 dots per inch for line art and 300 dots per inch for grayscale images. Saves in TIFF and EPS formats, recognizes 256 levels of grayscale, and scans legal-size documents. Optional 50-page sheet feeder and OCR software available.

geometric shapes and EPS or TIFF graphics.
$375. Stone Design Corporation, 2425 Teodoro N.W., Albuquerque, NM 87107. 505/345-4800, 505/345-3424 fax

The Font Company Type Library

A library of more than 1500 PostScript Type 1 typefaces. Buyers can purchase any number of fonts.
Price varies with the number of typefaces purchased. The Font Company, 12629 N. Tatum Blvd. # 210, Phoenix, AZ 85032. 602/998-9711, 800/442-FONT, 602/998-7964 fax

TouchType

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"Accessory software" for creating and controlling display type for book covers, titles, logos, and other projects. Simple to use and powerful.
$249. RightBrain Software, 20 Medway Rd., Woodside, CA 94062. 800/472-7246

WordPerfect

A word processor featuring columns, macros, merge, table of contents, indexing, spell checking, a thesaurus, footnotes and endnotes generation, graphics manipulation, and an automatic timed backup system.
$495. WordPerfect Corporation, 1555 N. Technology Way, Orem, UT 84057. 801/225-5000

Connectivity/ Communications

AFS 3.0

A distributed file system for networks linking up to thousands of computers. Offers common file space for all users regardless of location. Equipped with a window for monitoring file server status, an on-line backup system, and various security features.
Starts at $7000; discount for educational institutions. Transarc Corporation, The Gulf Tower, 707 Grant St., Pittsburgh, PA 15219. 412/338-4400, 412/338-4404 fax

Communicae

Software that enables NeXT computers to communicate with DEC and IBM mainframes and minicomputers and other information services. Permits communication with many graphics and CAD mainframe and minicomputer applications.
$395. Active Ingredients, 222 Third St. #0234, Cambridge, MA 02142. 617/576-2000, 617/576-3609 fax

GatorBox

Hardware that links a Macintosh network to Ethernet, so that users on both LocalTalk and Ethernet share laser printers, e-mail, and storage. Also provides TCP/IP services for terminal sessions from Macintosh computers to UNIX hosts.
$2795. Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999, 617/494-9270 fax

GatorMail

A bridge between QuickMail or Microsoft Mail and any UNIX mail systems on SMTP networks, including Internet. Features mail exchange, aliasing, and data enclosures.
$995 (10-user package). Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999, 617/494-9270 fax

MacLinkPlus/PC

A kit containing more than 100 translators that transfer and translate files between the NeXT and Macintosh environments. Some of these translators provide a databridge between WriteNow for NeXT and many Macintosh word processors (such as MacWrite, Microsoft Word, WordPerfect, and WriteNow). Also transfers and translates data from DOS files accessed through the Macintosh desktop.
$199. DataViz, 35 Corporate Dr., Trumbull, CT 06611. 203/268-0030, 203/268-4345 fax

3270Vision

◆ ◆ ◆ ◆ (beta)

A powerful 3270 terminal emulator that allows IBM mainframe connectivity from the NeXTstep environment. 3279Coax is an adaptor box that connects the NeXT's SCSI port to an IBM 3174 or 3274 controller.
$695 for 3270Vision; $2295 for 3270Coax. Conextions. 79 Wildwood Rd. #200, Andover, MA 01810. 508/475-5411

Worldtalk/400

An enterprise-wide messaging system that interconnects many existing messaging applications for computers with UNIX, OS/2, Netware, MS-DOS, and Macintosh operating systems. Compatible with other vendors' X.400-based messaging products and with European messaging standards.
$5000 for Worldtalk/400 core; $3000 for Worldtalk/400 Gateway Engine. Touch Communications, 250 E. Hacienda Ave., Campbell, CA 95008. 408/374-2500, 408/374-1680 fax

Databases

GatorShare

Software that resides in the GatorBox allowing file and data sharing between Macintosh and NeXT computers, transforming the NeXT computer into a nondedicated file server for the Macintosh.
$1995. Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999, 617/494-9270 fax

INGRES Relational Database Management System

An application development environment providing 4GL, SQL, and visual programming methods. Created applications are instantly portable across multiple hardware platforms.
Price varies. Ingres Corporation, 1080 Marina Village Pkwy., Alameda, CA 94501. 415/769-1400, 800/4INGRES, 415/748-2545 fax

MediaStation 1.2

A database for multimedia data acquisition and processing. Features include high-resolution image scanning, CD-quality audio recording, text processing, and frame-by-frame animation.
$2500. Imagine, 32 N. Washington #14, Ypsilanti, MI 48197. 313/487-7117, 313/487-1323 fax

Objective DB Toolkit

An object library that bridges the gap between the Sybase database engine and developer applications. Provides extensive templating for TextFields and mapping of palette objects to database data types. Accommodates text, image, and sound data and supports text, buttons, and slider arrays.
$995. Professional Software, 599 North Ave., Wakefield, MA 01880. 617/246-2425, 617/246-2443 fax

ORACLE Relational Database Management System

An RDBMS that simplifies application development and operation by implementing fourth-generation capabilities. Runs on more than 80 different computer platforms. Oracle applications and data move easily from one platform to another without modification.
For price, contact Oracle Corporation. Oracle Corporation, 20 Davis Dr., Belmont, CA 94002. 800/345-3267

SYBASE SQL Server

Server software based on Sybase's SQL RDBMS. Features include client-server architecture to separate front-end and back-end functions, distributed data management, and the DB-Library SQL Server Interface to connect applications with the SQL Server.
For price, contact Sybase. Sybase, 6475 Christie Ave., Emeryville, CA 94608. 415/596-3500, 800/879-2273, 415/596-4508 fax

Scientific

Airfoil Design Kit

An engineering tool for computing the aerodynamic characteristics of two-dimensional airfoils. Analyzes existing airfoils in the Airfoil Library, predicts the effects of modifications, or makes new designs.
For price, contact Alva Computer. Alva Computer, 163 Alaric Dr., Hampton, VA 23664. 804/851-6830, 804/851-1826 fax

DAN, The Data ANalyzer 1.0

An engineering and scientific data analysis system. Capabilities range from input and output of several data file formats to table generation, mathematical manipulation of data tables in memory, and complete X-Y coordinate-plotting support. Any number of overlaid plots are available with distinguishing styles, plot symbols, and grayscales.
$795. Triakis, 560 Bryce Ave., Los Alamos, NM 87544. 505/672-3180

Mathematica

An application for both interactive calculation and high-level programming. Performs almost any numerical, symbolic, or graphical mathematical manipulation. Displays 2D and 3D plots of functions and data and 3D object modeling.
For price, contact Wolfram Research. Wolfram Research, 100 Trade Center Dr., Champaign, IL 61820. 217/398-0700

Spring

A program for exploring the second-order differential equation that models the motion of a mass on a spring. Features graphs and real-time animations of the solution and the parts of the solution. Useful for teaching and studying university-level mathematics.
$20. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Math++ 2.0

A C-language math library of 100 functions designed to support numerical analysis in applications. Includes over 1.5MB of source code and a 470-page user's guide with numerous program examples.
$295. Triakis, 560 Bryce Ave., Los Alamos, NM 87544. 505/672-3180

Taylor

An interface to Mathematica that allows users to investigate Taylor polynomials. Users specify the function to be approximated, the degree of the Taylor polynomial desired, and the center point of the expansion. Taylor then graphs the function and its approximating polynomial on the same axes.

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- ☐ 12) NeXT
- ☐ 13) Unix workstation

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- ☐ 16) Communications Week
- ☐ 17) Computer Reseller New
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- ☐ 19) Forbes
- ☐ 20) Fortune
- ☐ 21) Infoworld
- ☐ 22) LAN Times
- ☐ 23) MacUser
- ☐ 24) Macweek
- ☐ 25) Macworld
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$2195. HSD U.S., 1350 Pear Ave., Ste. C, Mountain View, CA 94043. 415/964-1400, 415/964-1538 fax

SCSI488/N

An IEEE 488 interface plus a software driver that gives the NeXT computer control of up to 14 IEEE instruments. Uses familiar Hewlett-Packard–style IEEE commands while providing transfer rates as high as 900KB per second. Attaches to the SCSI port, leaving an expansion slot open.
$1495. IOtech, 25971 Cannon Rd., Cleveland, OH 44146. 216/439-4091, 216/439-4093 fax

VISUS Digital Document Scanners

The Personal Page Scanner (with optional autofeeder) scans any document up to legal size. For high-volume workload and larger documents, the Departmental Scanner (11 x 17 inches) and the Large Format Scanner (24 x 60 inches) scan at resolutions up to 400 dots per inch. The Industrial Scanner scans at resolutions up to 2000 dots per inch with an absolute gauging accuracy of .002 inch over a distance of 24 inches.
$1395 for Personal Page Scanner; $2295 for autofeed; $17,995 for Departmental Scanner. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

VISUS Fax Modems

A pocket-size, battery-powered, Group III device that sends, receives, and automatically files faxes. Designed for high-volume applications and supports Professional PaperSight workgroups over a NeXT network.
$995. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

Business

Calendoscope

An appointment calendar program for individuals or organizations. Appointments are listed by day, week, month, or year. Agendas and notes can be attached as documents. Appointment notification options include sound, pop-up windows, and e-mail.
$95. Stained Glass Software, 1173 Kent Ave., Sunnyvale, CA 94087. 408/249-3337

Lotus Improv 1.0

● ● ● ● (beta)

With a revolutionary model custom-made for data analysis, Improv is an essential spreadsheet for anyone doing financial modeling. Its first release, however, lacks such basic important features as an undo command and a macro language.
$695. Lotus Development Corporation, 55 Cambridge Pkwy., Cambridge, MA 02142. 617/577-8500

OMEN III

A stock-quotation system incorporating client management, technical analysis, real-time news retrieval, and on-line order entry functions. Live connections to spreadsheets and analytical programs update linked charts, reports, and tickers. Provides voice and visual alerts when any security, currency, commodity, or index limits are reached.
For price, contact Microstat Development Corporation. Microstat Development Corporation, 2150 Western Pkwy., Vancouver, BC V6T 1V6, Canada. 604/228-1612, 604/228-9793 fax

PaperSight Light

A digital file cabinet that can be used on a stand-alone system or integrated network. Accepts and refiles documents from a variety of input sources. Text and voice annotations and markup overlays can be added.
$695. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

PowerStep

● ● (beta)

A capable spreadsheet, equipped with most of the power features pioneered by leading PC and Mac spreadsheets, marred by an Interface-Builder-gone-wild design.
Price to be announced. Ashton-Tate Corporation, 21010 Hamilton Ave., Torrance, CA 90509. 800/437-4329, ext. 3717

Who's Calling? 1.0

A client-management system that imitates many routine office functions by combining relational database technology with simple file interfaces. Voice messages remind users to make phone calls and to announce appointments, while a message board sends text, voice, and images to others on a network.
$495. Adamation, 1435 Center St., Oakland, CA 94607. 415/452-5252

Wingz 1.1

● ● ●

A powerful, English-like programming language and stunning 3D graphics put this spreadsheet out front for users who care about those things. However, rudimentary file links and 2D files that make modeling difficult, and a clunky interface, make this a less than stellar entry.
$699. Informix Software, 16011 College Blvd. Lenexa, KS 66219. 913/599-7100, 913/599-7350 fax

Groupware

Professional PaperSight

An image-management program for scanning, viewing, organizing, filing, searching, and archiving documents, and sending and receiving faxes. Overlays can be used for multiple layers of corrections, annotations, and written or recorded messages. Optional intelligent character recognition available.
$1695; $1795 for character recognition. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

Redmark

A paperless review program that allows multiple reviewers to proof and critique documents by marking up a transparent overlay on the original. Annotation options include standard proofreading symbols, drawing tools, text, voice recordings, and imported graphics.
$345; $995 for four copies. Epitome, 11015 Sonja Dr., Knoxville, TN 37922. 615/675-0910, 615/966-2558 fax

Graphics

Adobe Illustrator

A graphic design and illustration program that uses Display PostScript, and includes freehand, auto trace, geometric shapes, pen, and blend tools. Compatible with versions of Adobe Illustrator on other computer systems.
$595. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 800/344-8335, 415/961-3769 fax

ClickArt for NeXT

A collection of nearly 400 illustrations in EPS format. The Business Art segment includes images of office equipment and symbols for occupations, communications, and transportation. Other illustrations show people, animals, maps, sports, and food.
$295. T/Maker, 1390 Villa St., Mountain View, CA 94041. 415/962-0195

Create!

● ● ● ● (beta)

A full-featured Color PostScript drawing and paint environment for manipulating and adding special effects to graphic objects and text.
$495; low-cost upgrade for TextArt owners. Stone Design Corporation, 2425 Teodoro N.W., Albuquerque, NM 87107. 505/345-4800

Diagram!

● ● ● ● (beta)

A "digital whiteboard" that creates everything from organizational charts to annotated illustrations.
$399. Lighthouse Design, 6516 Western Ave., Chevy Chase, MD 20815-3212. 301/907-4621, 800/366-2279

MundoCart/Optical

A map database that produces maps of all parts of the world at different scales and levels of detail. Cartographers combine the maps they create with standard NeXT desktop publishing tools. Includes custom drawing tools and projection and ellipsoid panels.
$14,800. Chadwyck Healey, 1101 King St. #380, Alexandria, VA 22314. 800/752-0515

TopDraw v. 1.0

An object-oriented drawing package that integrates graphics, text, and raster images. Accepts EPS, MIF, TIFF, and RTF formats. Drawing objects include a spectrum of geometric shapes, with many object-fill properties. Text can be edited after applying graphic manipulations. Also features user-definable color palettes and spot color separations.
$595. Media Logic, 2501 Colorado Ave. #350, Santa Monica, CA 90404. 213/453-7744, 213/453-9695 fax

Text Processing/DTP

Adobe Plus Pack

A collection of 26 additional fonts to supplement the 13 standard fonts on NeXT computers. Typefaces include Palatino, ITC Bookman, ITC Zaph Chancery, ITC Zaph Dingbats, ITC Avant Garde Gothic, ITC New Century Schoolbook, and Helvetica Narrow and Condensed.
$495. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 800/344-8335, 415/961-3769 fax

FrameMaker 2.0

A publishing environment that integrates word processing, graphics, page layout, equation-editing, and book-building tools.
$995; academic price $495. Frame Technology Corporation, 1010 Rincon Cir., San Jose, CA 95131. 408/433-3311, 408/433-1928 fax

TextArt 1.0

A combination drawing package and PostScript generation tool that skews text, places it in a straight line, around a circle, or in an arc or rose, and adds shadows. Controls letter placement with track, sector, and pair kerning. Basic drawing functions combine images with

$20; site license $80. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Vertical Market

SimuLEARN

A desktop toolkit for producing interactive computer-based instructional materials. Uses graphics, sound, video, and a linking and branching facility to guide the learner through simulations at his or her own pace. Allows student to attach electronic comments addressing the author of the projects, modules, or lessons.
For price, contact Knowledge Transfer International. Knowledge Transfer International, 5080 Spectrum Dr. #912W, Dallas, TX 75248. 214/233-7693, 214/233-3319 fax

VTLS InfoStation 1.0

A hypermedia information-access system for library automation. Provides on-line catalog search and retrieval of audio, textual, and graphic data. The audio-visual help system gives users digitized voice instructions, line drawings, and text explaining how to use the program.
$995; contact VTLS for network prices. VTLS, Virginia Tech Corporate Research Center, 1800 Kraft Dr. #200, Blacksburg, VA 24060. 703/231-3605, 703/231-3648 fax

Developer's Tools

Absoft Object-Oriented FORTRAN 77 (v. 2.1)

A full implementation of the ANSI X3.9-1978 and MIL-STD 1753 FORTRAN language definitions designed for scientific and engineering users who want to port and develop programs from mainframe, mini, and workstation environments.
$995; academic price $750. Absoft Corporation, 2781 Bond St., Rochester Hills, MI 48309. 313/853-0050, 313/853-0108 fax

ACUCOBOL-85

System software that produces machine-independent object code. Offers a multiple-version source control system, a split-screen interactive source code debugger for viewing, and interlanguage communication flexibility. Supports most features of Data General ICOBOL.
$2995. Acucobol, 7950 Silverton Ave. #201, San Diego, CA 92126. 619/271-7097, 619/566-3071 fax

AKGH

System software that utilizes NeXT multimedia capabilities to create user-friendly application instructions, procedural guidelines, and personalized internal help. Hypertext-style links can be set up to combine text, sound, and graphics. Uses NeXT SQL Server to store multimedia information.
$385 without optical disk; $485 with optical disk. Information & Communications, 5601 La Jolla Blvd., La Jolla, CA 92037. 619/454-9160, 800/776-9966, 619/454-9766 fax

Allegro CL

A full-featured Lisp programming environment that is compatible with Objective-C, Interface Builder, and the Application Kit. A foreign function interface allows programmers to call FORTRAN and C routines. Also offers debugging options and generation-scavenging garbage collection.
For price, contact Franz. Franz, 1995 University Ave., Berkeley, CA 94704. 415/548-3600

Displaytalk 1.0

An integrated development environment for Display PostScript programming. Useful for creating and testing pswraps during program development, and for designing and developing full-screen PostScript animation.
$995. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 415/961-4400, 415/961-3769 fax

Flexible License Manager v. 2.0

A network-wide, multiaccess package that allows software to be licensed on a concurrent-usage basis. Features include software that runs on any network node, enforced software expiration dates, demonstration software that can be licensed over the phone, and a log file that records all license transactions.
$12,000 one-time binary license fee. Highland Software, 940 E. Meadow Dr., Palo Alto, CA 94303. 415/493-8567, 415/493-4506 fax

Macro Cross Assembler

A program that translates one or more source fields containing DSP instruction mnemonics, operands, and assembler directives into object modules that are relocated and linked by the DSP96000 Linker. Features functions for data conversion, error checking, and transcendental math.
For price, contact Motorola. Motorola, Digital Signal Processors, MD: 0E314, 6501 William Cannon Dr., West Austin, TX 78735. 512/891-2030, 512/891-2947 fax

NeuExpert

A knowledge representation tool that combines expert system and neural network cababilities. Supports statistical rule analysis, uncertainty, graphic knowledge representations, backward chaining, and system learning. Limited object-oriented knowledge structures can be defined by the user.
$25,000. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628-DISK, 415/948-6296 fax

NextBus Development Kit

Hardware and documentation for designing a NextBus board. Includes documentation for the NextBus and the NextBus Interface Chip (NBIC), preliminary information on writing loadable kernel drivers, two NBIC chips, a prototype board, and a disk containing related software tools and examples.
$350. NeXT Computer, 900 Chesapeake Dr., Redwood City, CA 94063. 800/848-6398, 415/780-2801 fax

[OT Palettes: 1.0]

A family of custom object palettes for use with the Interface Builder application. Each palette combines objects of similar form and function, such as SmartFields, Chooser, and Math.
Prices vary according to object. Objective Technologies, 7 Dey St. #711, New York, NY 10007. 212/227-6767

Oasys Compiler Family

A group of language compilers based on the Green Hills integrated family of compilers (C, FORTRAN, and Pascal). All the languages are inter-language callable. Offers procedural inlining, register caching, common sub-expression elimination, strength reduction, and loop unrolling. Provides full 68881, 68882, and IEEE floating-point support.
$1500 per language. Oasys, 230 Second Ave., Waltham, MA 02154. 617/890-7889, 617/890-4644 fax

PaperSight Developer's Toolkit

More than 70 code and data modules to aid the VAR or turnkey developer in image management. Includes modules for scanning, fax input and output, image compression and decompression, image transformation and character recognition, text and voice annotation, annotation-based indexing, and voice help.
$40,000. Visual Understanding Systems, 4300 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

Simulator Programs

Two software programs to aid in the development of programs and algorithms running on the Motorola DSP56000 and DSP96000. The SIM56000 program emulates all of the functions of the DSP56000/1. The SIM96000 provides identical functions for the DSP96000 family.
For price, contact Motorola. Motorola, Digital Signal Processors, MD: 0E314, 6501 William Cannon Dr., West Austin, TX 78735. 512/891-2030, 512/891-2947 fax

UNIX MUMPS v. 3.1

A computer database and programming language specially suited for the interactive manipulation and storage of large volumes of medical and business data. Unlike conventional MUMPS (Massachusetts General Hospital Utility Multi-Programming System) implementations, UNIX MUMPS can be integrated into the UNIX environment and supports transparent, distributed, and heterogeneous networks.
$595 for single user; $5500 for multi-user (one to four seats). Toltec Human Services, 5005 N. Pennsylvania Ave. #301, Oklahoma City, OK 73112. 405/840-4254, 405/840-3041 fax

Other Products

LiNK-IT v. 1.0

A hypertext system for linking information and documents. A built-in macro language facility is available for advanced users to create input and sort templates.
$245; $195 through February 1991. Icarus Software, 17 Arlington St., Boston, MA 02116. 617/247-1350, 617/247-1527 fax

The First Compilation Disk

A collection of 400MB of the most popular software publicly available for NeXT computers. Includes utilities, programming languages, games, and information files. Also comes with one year of NeXT-specific Usenet network news and hundreds of old-fashioned UNIX programs.
$249. Lighthouse Design, 6516 Western Ave., Chevy Chase, MD 20815-3212. 301/907-4621, 800/366-2279

TheLibrary

An on-line information system for application developers and information publishers designed to work like the public library. "books" are found through a card catalog and located on "bookshelves." Features interactive on-line versions of books.
For price, contact We Design. We Design, 4286 Redwood Hwy. #237, San Rafael, CA 94903. 415/479-1105, 415/449-0967 fax

Classified

NeXTWORLD magazine Classifieds is a bimonthly feature. Rates effective January/February Issue, 1991. Per-line rates $40.00. Thirty -six characters equal one line (count each letter, space and punctuation mark as a character). Four-line minimum, seven lines per inch. For column inch rates, please call or write for complete rate card information. Check or money order (or certified check) must accompany copy and be received six days prior to close date. All ads accepted at the discretion of the publisher. *NeXTWORLD* magazine 501 Second St., San Francisco, CA 94107 415/978-3182.

USER GROUPS

The NeXT experience is meant to be shared. Connect yourself to the NeXT community through the Bay Area NeXT-user Group. For more information, contact BANG at: bang_request@meta-x.stanford.edu or P.O. Box 8858, Stanford, CA 94309 or fax 415/ 957-0512.

DESIGN SERVICES

The look of Good Design sells products in the 1990s. This is Design. John Van Hamersveld, Electronic Designer, 28247 Via Acero, Malibu, CA 90265 213/ 457-1747 Fax 457-5485.

Eye-catching icons and logos at affordable prices. In need of icons or logos for your NeXT application? Call Knox Design. In addition to designing icons and logos for top-selling software products, Knox has also produced a clip art library containing over 400 illustrations. Our diverse styles will give any software application a crisp professional look and feel while conveying their intended message. Knox Design, 300 Broadway, #29, San Francisco, CA 94133 415/ 398-0136.

RECRUITMENT

Conference Manager. Manage major new conferences in high-technology market. Experience in conference, seminar, special event and/or trade show management. An entreprenurial spirit and a penchant for details, schedules and budgets a must. Submit resume to: Executive Director, Integrated Media, Inc. 501 Second Street San Francisco, CA 94107 Fax 415 442-1891.

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Proven consulting and development services on the NeXT platform from Adamation. In just over a year and a half, Adamation's NeXT credits include: ported INGRES, a relational data base program, to the NeXT platform; Developed two commercial applications, Who's Calling? , a client management system, and Live Wire, a product for sharing multimedia information; Created over 30 font and back-end application development tools and objects; Provided various clients, including the William Morris Agency (a talent agency with a large network of NeXT computers) with consulting, design and custom software development services.

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Negroponte
Continued from page 100

Therein lies the first misunderstanding. Multimedia must be as media-independent as possible, and at the root of this kind of computing must be the ability to transcode information from one medium to another. A simple example would be moving text from the visual to the audio domain. Doing the reverse is slightly more difficult but still feasible.

A more fanciful aspiration would be to ask your computer to make a movie for you from a knowledge representation. Although this example may be beyond our reach for a long time, the point is not. We, as a community of researchers, must recognize the extraordinary need to decouple the explicative channel from the knowledge representation. As long as we think of multimedia as a quiltwork of presentational means, our aspirations for multimedia will be stunted. Instead, we must treat knowledge in a media-independent fashion in order to use the presentational channel to say the same thing in different ways.

2. The next misunderstanding is about mismatched impedance. By this I mean the degree to which researchers and manufacturers of multimedia systems have focused on the richness of output, the *son et lumiere* of data display, the power of storytelling. Contrast the quality of multimedia presentations with the back channel, or means by which the user can interact with the presentation. The wonderful ways through which the computer can communicate are mismatched with parsimonious devices and stingy input techniques. We give the user a mouse! This has to be the greatest I/O impedance in the history of computing.

A more appropriate view (and implementation) of multimedia publishing is derived from face-to-face, human-to-human communication, emulating the conversation, not the monologue. Gestural and speech input are examples of what is needed.

3. The third misunderstanding concerns video, of which HDTV (high-definition television) is the tip of an iceberg of confusion. Both resolution and bandwidth are at issue. (Fully digital video is assumed.)

The misunderstanding about video resolution stems from the built-in, almost subconscious, assumption that the source of a picture has a fixed number of scan lines. Whether the resolution is 525, 625, 1125, or 1250, we assume a video signal to be a given number of lines, no matter how large or small the picture (that is, the receiver) may be. In the "old days" this made sense, because as the screen became bigger and bigger, we assumed that the user would sit further and further away from it, ultimately reaching the canonical distance for a couch potato.

Today, this situation has changed. Our distance from the screen of a workstation does not change as a function of the screen's size. Our thinking about computer screens is more print-like, wherein the number of pixels per square inch becomes the meaningful and operative measure. Unlike Hollywood, we have no predispositions to always fill up the screen; we are a windows culture. For these reasons, and others, the signal itself should be scalable. By scalable I mean there should be variable resolutions and resolution independence (as well as frame-rate independence and aspect-ratio independence). In this way, we can deploy a full range of images, from postage-stamp-size movie icons to wall-size displays, derived from the same representation. In an entertainment example, you could expect the cost of pay TV to vary as a function of the resolution you want (pay-per-view-per-bit). The concept of scalable video may be the single most important idea of the coming decade; it will make video international and useful on all screens, including those yet to be invented.

The bandwidth rut in which we find ourselves has as much to do with stubbornness and smallness of thinking as it does with bandwidth as such. The technical worlds of 64Kb video, 1.5Mb video, and digital TV (studio quality: normal and HDTV) are like three lanes of a highway, each separated by an insurmountable median strip. Each group is optimizing at the expense of a continuum. A wiser approach is to consider that each additional bit per second could provide a nominal or not-so-nominal increase in resolution. In this regard, the International Standards Organization's Motion Picture Experts Group (MPEG) is poised to do a major disservice to the industry by ignoring scalable video and squeezing every last ounce of picture quality out of 1.5Mb per second.

4. The fourth misunderstanding may be the greatest. This confusion is over the difference between symmetrical and asymmetrical coding schemes for video compression—the difference between coding real-time video (as required in teleconferencing) and non-real-time video (movies and multimedia publications). Some scientists would have you believe that there is none. This is because they have misunderstood the difference. The difference is look-ahead (multiple passes) and recomputation (post-compression).

Look-ahead, by which I mean seconds and minutes, not milliseconds, is the ability to view a video sequence as an average bandwidth versus worrying about instantaneous peaks. In coding a movie, one assumes a single encoding process and millions of decodings. This assumption is correct, but it misleads researchers because it is not the main point about asymmetry. The main, or even only, point is that you can make multiple passes at the data, stuffing the bandwidth peaks into the bandwidth troughs. In this way, any bandwidth can be accommodated for a given movie (yes, each movie is different) with sufficient memory in the receiver. Clearly, the memory skyrockets below a certain bandwidth, but the 1.2Mb per second or T1 (in the U.S. or Europe) is well above that point for video as we know it.

A clear reason to opt for off-line compression is that recomputation becomes possible, where more and more passes at the image stream allow for additional compression. In the future, this will include understanding image content to compress data still further. But even limiting our horizon to pushing pixels, more and more sweeps at the data (with look-ahead) will unquestionably allow better compression (for example, by reordering the sequences).

However, what happened in the industry and, hence, in the minds of many, is that Digital Video Interactive (DVI), first at RCA and now at Intel, proposed and marketed an excellent asymmetrical scheme. But potential buyers were expected to send their movies to a DVI "movie factory" to be compressed. This distasteful idea did a disservice to desktop asymmetrical compression in general and steered most people away from such techniques, even if they were deployable on the desktop. In fact, this may have cost DVI the opportunity to become a serious standard. If asymmetrical coding had been explained in the following way, no one would dispute its value: You can leave your computer on all night, and the next morning your video files will be half the size, double the resolution, and in a format compatible with symmetrical coding.

5. The final misunderstanding about multimedia is that we are misreading the markets. Multimedia has brought a great many computer-aided instruction types from the sixties and seventies,

along with their ideas for "drill and practice," out of the closet (where they should have stayed). The major marketing thrust is in education, from early learning to adult training. If you are in the education multimedia market, you are a pioneer and are probably ahead of the market. As an educator, I cannot argue against the importance of this market, but exactly how big it is and whom it comprises may not be what is expected. For example, when considering the K–12 market, there is a simple problem: Who is the customer? The child, the teacher, or the school system? Each is distinctly different.

Also, in education, many people regard multimedia today in the same manner as they viewed an advanced human interface ten years ago. Namely, they speak of it as a luxury, not a necessity. In the case of multimedia "courseware" (a word that gives me the willies), people talk about competing with Nintendo or Bill Cosby for a child's attention. That is a very suspect motivation, even though Nintendo is a wonderful example of "I/O compatible" multimedia and, perhaps, the biggest educational force in our nation.

The education market is certain to become better defined and to develop into a large business. But in the meantime, why are people so blind to the bigger market that will evolve from telecommunications deregulation? The huge multimedia market that surely will burst open is electronic Yellow Pages. It will happen not *if* but *when* the divested telephone companies are allowed to enter the information services business. I am convinced that a groundswell of consumer demand will make this happen sooner rather than later.

When it does occur, the Yellow Pages, as a literal example and as a metaphor for personalized direct mail, will be a perfect application for multimedia publishing. It is an example consisting of two consenting adults, so to speak, a buyer and a seller. The seller has a self-interest in making the material. The buyer has a goal and a need. The combination will need little help to evolve into an enormous market for multimedia computing. Just look at what the French Minitel System was able to do with only the White Pages. Imagine what we could do with the Yellow Pages.

Such dreams for multimedia computing in the home are dampened by the threat of Compact Disc Interactive (CD-I) making it to the market. This imminent commercial venture is, so far, a closed system and a television peripheral, designed with the belief that computers, as such, are the anathema of the proverbial man in the street. The 25 million Nintendos in the U.S. today suggest that this is not true. In fact, the very market that CD-I is targeting, and which I hail as being the big one, is a market well imbued with computing engines. What we need instead of CD-I is an open architecture for multimedia, wherein a cottage industry can grow in parallel with the emergence of professional materials.

I am constantly reminded that new media are set into motion by "hits." Charlie Chaplin drove movies. Caruso made the 33 rpm record. And, in a real sense, spreadsheets launched PCs. It is also the case that new media start out by mimicking their predecessors and gain their own character much later in time.

Multimedia is not likely to follow these patterns, as it is not an extrapolation but a synthesis of means, calling equally on the right and the left brain, begging for plural thinking. It is not the evolution of one means of expression into another; it is the combination of ways that are highly concurrent and redundant. The misunderstandings result from incremental thinking about multimedia and will be corrected only with fresh imagination and orthogonal conceptions. If we can think more clearly and invent cleverly, we'll see a rich world of home information and entertainment products and services. In that world, our TV set and computer will be one and the same, and talking to them will be like talking to another person.

Nicholas Negroponte *is director of MIT's Media Lab in Cambridge, Massachusetts.*

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WASHBURN GRAPHICS

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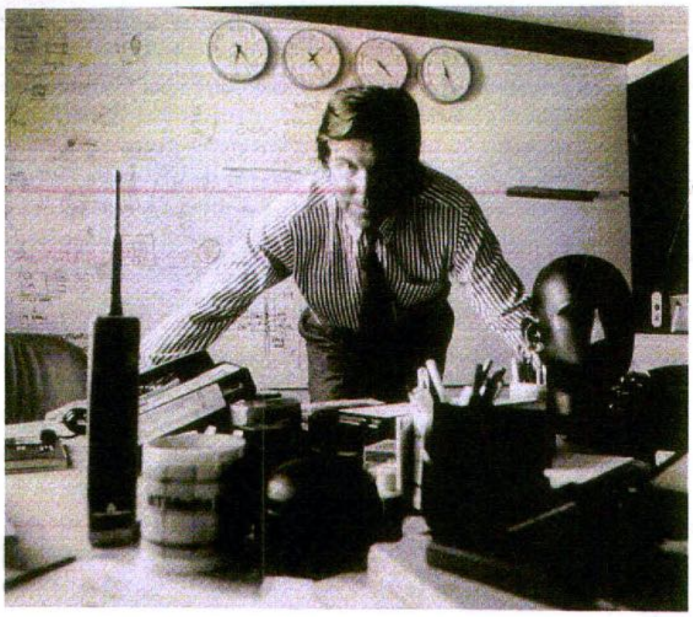
Photography/Hiroshi Nishikawa



Vanishing Point/Nicholas Negroponte

Multimedia publishing—rarely have so many people been so interested in the same thing at the same time. However, in spite of such concentrated attention and major corporate commitments, the topic is plagued by a handful of misunderstandings. The following remarks are my interpretation of the most serious points of confusion.

Before I enumerate these, it is important to recognize that we are in a curious period, one on which historians will look back with some puzzlement. We are experiencing two common, but totally separate, technological evolutions. On one hand, we have manufacturers of television receivers putting more and more computing into their TVs. On the other hand, we have computer makers putting more and more video into their computers. Looking back on this period, historians from the next millennium will wonder why these two business and engineering groups did not talk to each other, and why computer manufacturers were so reluctant to recognize that their biggest market was going to be in home information and entertainment appliances and services.

To the degree that one can regard these approaches—TV + computing and computer + video—as being in a race, I predict with great confidence that computer + video will win the race and become the defacto TV of the future. Broadcast television as we know it will slowly, or not so slowly, die (except for sports and election results). Multimedia computing won't be known by that name necessarily, but will emerge as the television of tomorrow, as interactive movies, as electronic games, books, magazines, newspapers, Yellow Pages, and the like.

Now for the multimedia misunderstandings, of which five come to mind.

1. The commonly held definition of multimedia is this: a synchronized meeting of text, sound (music and voice), still images, animation, and video *at the screen*. Today's challenge is twofold: (a) to put all the data types in correct digital form and (b) to provide tools that will choreograph their progress in space and time (call this authoring, if you will). These two challenges carry the assumption that these streams of data are concurrent but separate. They meet only at the screen.

Continued on page 98

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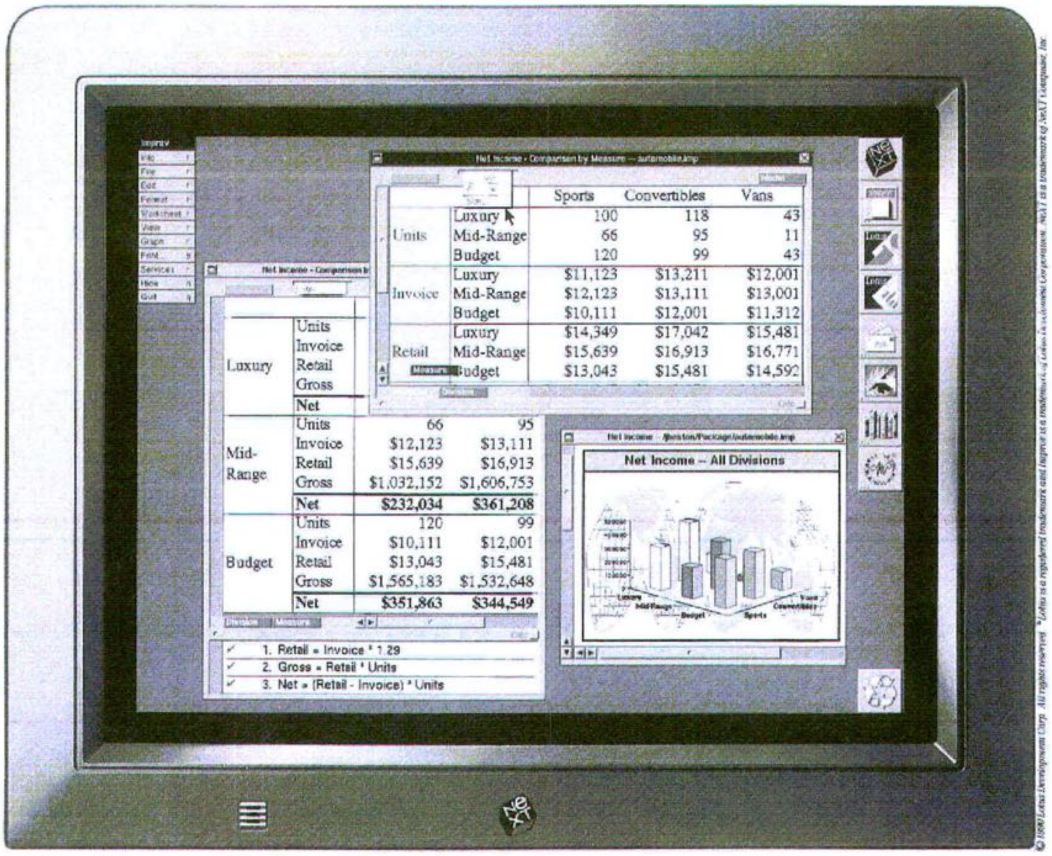
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		Sports	Convertibles	Vans
Units	Luxury	100	118	43
	Mid-Range	66	95	11
	Budget	120	99	43
Invoice	Luxury	$11,123	$13,211	$12,001
	Mid-Range	$12,123	$13,111	$13,001
	Budget	$10,111	$12,001	$11,312
Retail	Luxury	$14,349	$17,042	$15,481
	Mid-Range	$15,639	$16,913	$16,771
	Budget	$13,043	$15,481	$14,592

Luxury	Units		
	Invoice		
	Retail		
	Gross		
	Net		
Mid-Range	Units	66	95
	Invoice	$12,123	$13,111
	Retail	$15,639	$16,913
	Gross	$1,032,152	$1,606,753
	Net	**$232,034**	**$361,208**
Budget	Units	120	99
	Invoice	$10,111	$12,001
	Retail	$13,043	$15,481
	Gross	$1,565,183	$1,532,648
	Net	**$351,863**	**$344,549**

✓ 1. Retail = Invoice * 1.29
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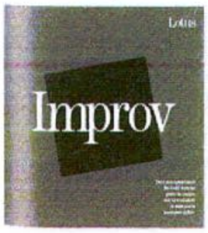
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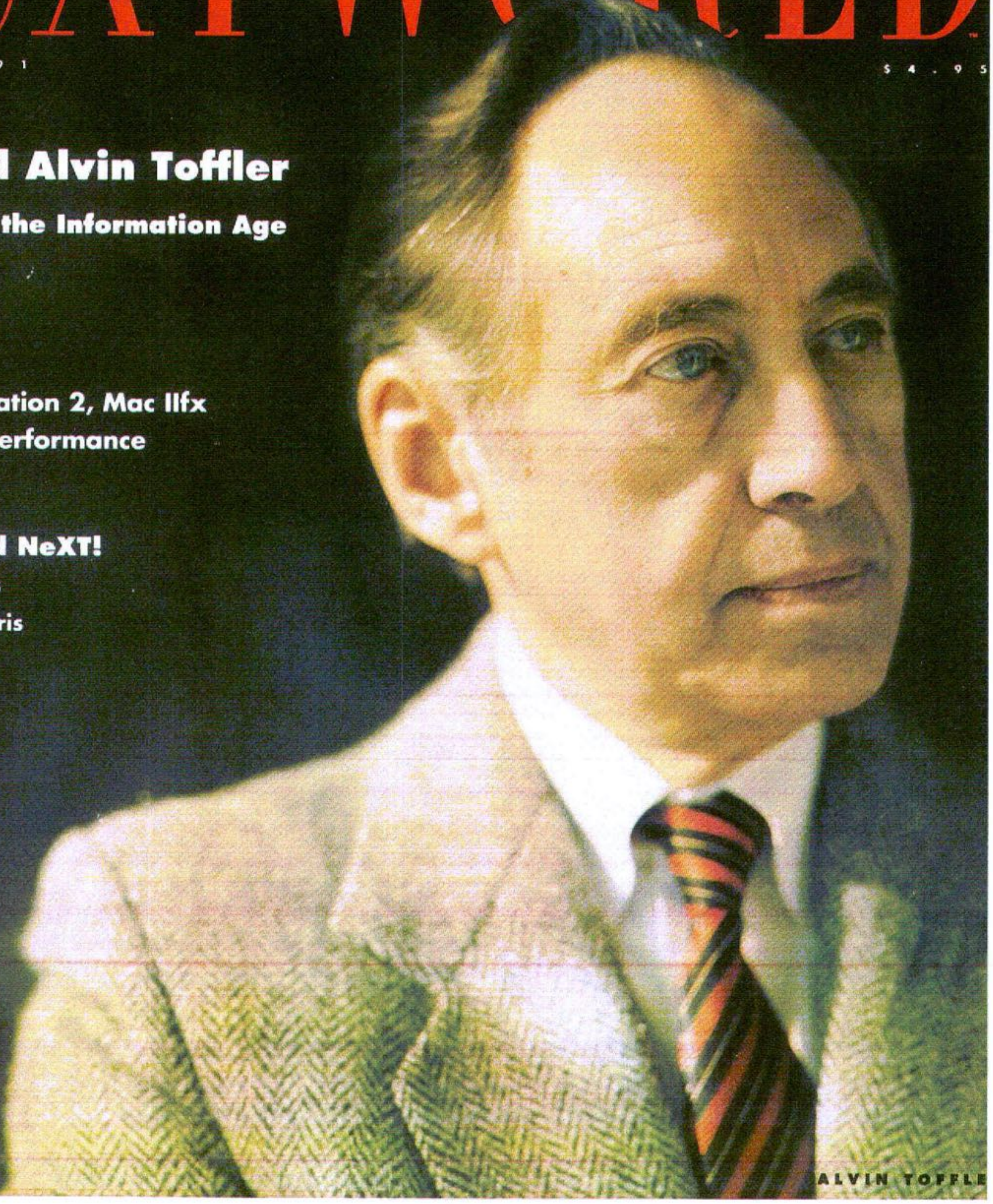
ALVIN TOFFLE

Heidi and Alvin Toffler

Powershift in the Information Age

Showdown

NeXT, SPARCstation 2, Mac IIfx

Price, Power, Performance

It's Hollywood NeXT!

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Digital Microphone

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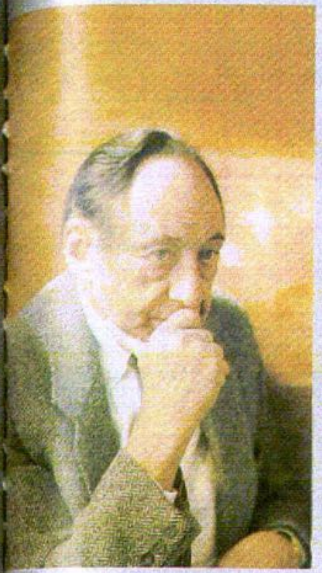

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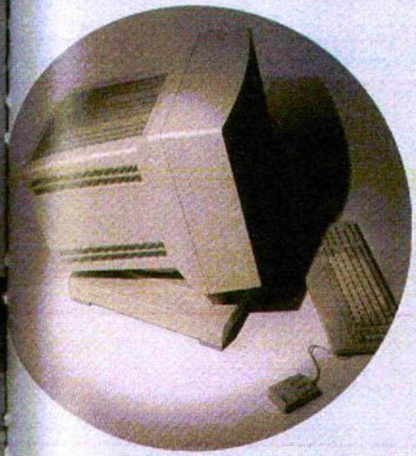

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Letters

The Other Worlds

Now I want a Cube, and it's all the fault of your first issue!

Until reading your articles on music and real-time video, I did not really comprehend what the NeXT was all about. It was not clear to me why this was a real step forward in the PC revolution.

Instead of going for a '486 motherboard, I'm now considering a Cube. People buy computers to run the particular programs they use and view as essential. In my case, it's Ventura. What really turned me around was finding out about SoftPC for the NeXT. If I can run DOS/GEM Ventura, or even Windows, then the NeXT *really* makes sense.

I urge you to provide continuous coverage of other-world applications running on NeXT under an emulator. If NeXT had both a good SoftPC and a great SoftMac, NeXT owners would have all three worlds in one!

Yo! Steve! Listen up!

Malcolm Dean, *Senior Editor*
Office of Academic Computing
University of California, Los Angeles
Los Angeles, California

Double-Sided Policy

NeXT should take cues from Dan Lavin's column about beefing up sales channels (NeXT Ink, January/February 1991), because they need better distribution.

Few people know this better than I. I have been trying hard to buy a NeXTcube since late October but haven't been able to find one. According to a person I talked to at NeXT, deals with several retail chains are in the works. No deal would come too soon for them, since BusinessLand is a complete washout.

I've also been thinking about the sore point of removable media. If you asked NeXT about floppies a year ago, the response was, "Why do you need floppies when you have optical?" Ask the same question today and the response is, "Why do you need optical when you have floppies?"

I speculate that both NeXT and Canon had planned to have a double-sided, high-speed optical drive ready by the end of 1990. But when they apparently weren't ready to ship, NeXT was left with the marketing problem of what to endorse. Obviously, they had to endorse floppies, since floppies were badly needed in the first place. But with the optical, they had to either discourage users from buying it until the new double-sided drive was ready or continue selling the slow, single-sided disks and drives and then face the music from users when the new technology arrived.

It seems that NeXT and Canon took the safe road. That would explain the sudden about-face of NeXT's opinion on optical drives. It would also explain Canon's current "shortage" of single-sided optical disks.

John Coppinger
Lexington, Kentucky

Exchanging Ideas

It's about time the NeXT community had its own periodical. Thanks for the superb premiere issue of *NeXTWORLD*.

It seems that I live to exchange hordes of data between a PC and a Mac. Although not a particularly pleasant task, I have learned, as a management consultant, to live with this necessary evil. The NeXT was to be my savior from this drudgery.

I had hoped (and still do) that interactive links could be established between a fast, functional relational database—like Paradox—for the NeXT to feed data to a spreadsheet—like Improv—that could make function calls to Mathematica and then send output to a custom-programmed front end using Interface Builder, et al.

I am excited about the platform, but I hope the software vendors are listening. A powerful machine like the NeXT deserves *better* than what is available on PCs and Macs.

Michael A. Duke
Logan, Utah

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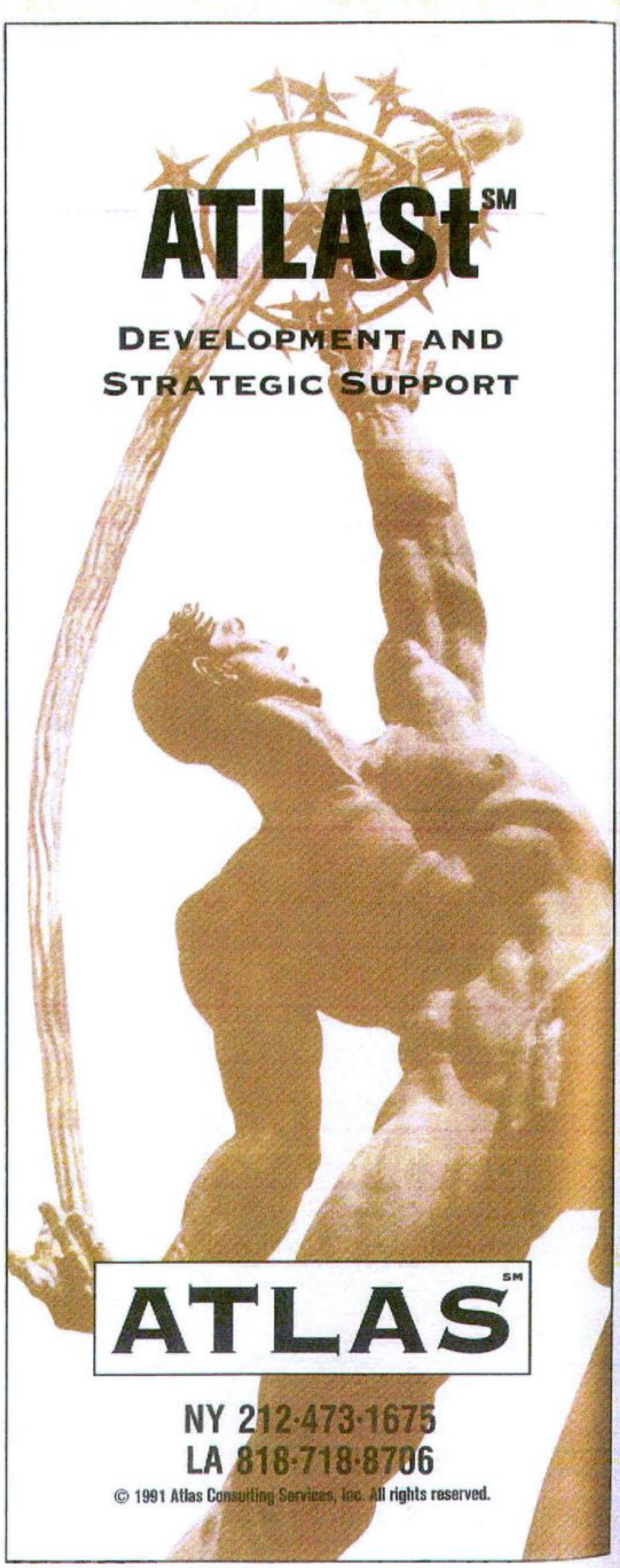

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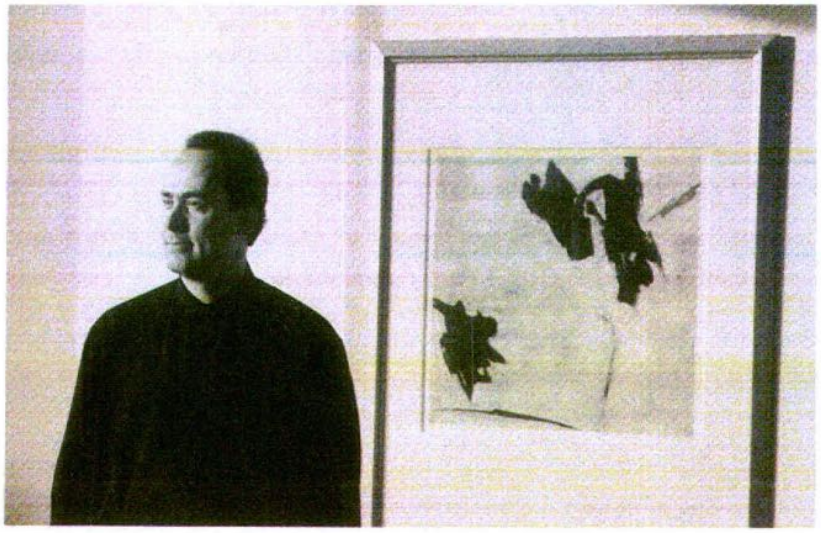

Black Box/Michael Miley

Once in a while, an event in the computer industry wakens dead hackers from their slumbers. One such event was the unveiling of NeXT's new professional workstations on September 18, 1990. In Davies Symphony Hall in San Francisco, Steve Jobs stood on the stage, outlined the history of microcomputers, and wowed the audience with the three revolutionary new machines that now set the pace for the future.

Here's another event in the same spirit. On January 23, at the Meridien Hotel in San Francisco, Go Corporation of Foster City, California, showed a prototype of its long-awaited operating system for pen-based notebook computers. Though the prototype notebooks used for the announcement were big and a bit heavy, you could still hold them in one hand and write with the other. Which is the point. A very big point.

Others thought so, too. Everyone was there: Jean-Louis Gassée, former senior VP of research and development of Apple; Stewart Alsop, trenchant industry analyst; IBM types; Apple and NeXT VPs; and the press, en masse. Pretty impressive. The software is a real innovation and should sell big. NCR Corporation of Dayton, Ohio, which will license Go's PenPoint software in a notebook computer that it plans to release this year, estimates that 1 million pen-based computers, worth about $2.3 billion, will be shipped in 1991 alone. Prediction, or self-fulfilling prophesy?

I'd say the prophets are lining up with the profits. Go has already won the backing of IBM, which has licensed PenPoint for a line of notebook computers it has under development. Some 40 companies are working on PenPoint projects. Bill Campbell, former CEO of Claris Corporation, the software arm of Apple, has jumped to Go to join founders Jerry Kaplan (originally from Lotus) and Robert Carr (originally from Ashton-Tate). And Bill Gates, head of the giant Microsoft Corporation, is scrambling to push his own system. Is this a new wave in computing? You bet. If you put your ear to the ground, you can hear the phones in Foster City ringing off their hooks.

But the question is, what does all this have to do with NeXT? Plenty. Think of it as a missing link for the moment.

Go directly to NeXT. When I travel down Highway 101 on my way to NeXT, I often glance at the giant 21-story Metro Center tower that looms over the highway in Foster City. Home to Go Corporation, *MacUser* magazine, and a number of other high-tech firms, it stands imperturbably above the landfill, a sturdy survivor of the 1989 earthquake that shook the valley to its foundations.

When you travel down Highway 101, go directly to NeXT, but do not pass up Go. While Bill Gates readies Pen Windows, a system tacked onto Windows 3.0, Go has built its pen-based system from the ground up, a step that shows a kindred spirit with the bold folks at NeXT who've often defied conventional wisdom for the sake of innovation. Instead of using a windowing strategy based on an interface of keyboards, mice, and disks, Go has developed its own object-oriented operating system and a Notebook User Interface for recognizing that revolutionary object called the pen.

With PenPoint, a notebook computer, and an electronic pen, you manipulate the computer with pen gestures such as circles, arrows, and taps. To delete something, you draw an X over it. To insert text, you draw a caret (^) where you want it to go. When you write, handwriting-recognition software transforms your hand-printed characters into computer-readable text. And you can draw, right on the electronic page.

The building engineer for Metro Tower could have used such a notebook after the quake. The first thing he had to do was inspect the building. That meant walking around every room, down every corridor, taking notes as he went, making quick, cursory sketches of cracks he'd noticed in the building or in the parking lots on either side, noting where pipes had broken and water had flooded low spots in the concrete. No laptop would have helped him here (he didn't have a lap). But when he was done, he still would have gone back to his office, plugged the thing into his workstation, and uploaded the data he'd tweak before e-mailing it to his boss.

Bingo. A missing link between the individual and the group. Which brings us back to NeXT.

Groups on the go. The scene that follows is a futuristic one that could have come straight out of Alvin Toffler's new book, *Powershift*. (See our interview with Alvin and Heidi Toffler in this issue.)

The year is 1996 and you're one of 15 sales reps in the boardroom at NeXT's Redwood City headquarters. It's the national sales meeting and the meeting has gone well. The NeXT has sold like hotcakes in the university, financial, medical, legal, and DTP markets. The message of a professional workstation for group computing has gotten through, loud and clear.

Your electronic notebook is plugged into a network socket under the boardroom table, just like those of the other 14 reps. Some of them have Grid logos on them, others have that familiar multicolored cube. After you give your spiel, you upload your figures to the wall-board computer for everyone to see (though you don't upload the notes you've taken on the spot). When you are done, Steve Jobs, president of the company, downloads them to the NeXTstation humming in the corner, so he can review them more carefully in his office. No doubt, you'll get his response later via e-mail. You, in turn, download the other reps' figures to your notebook to compare them with your own.

Point #1: A notebook computer, using forms that can be filled out simply with a pen, is an important way for a business professional to plug into his or her workgroup, solving different problems from those of a keyboard computer, though the Go system also allows it to be used with a keyboard. In short, a notebook computer can complement a full-powered stationary workstation. One is not a substitute for the other.

Any other advantages? Well, back in January, as *NeXTWORLD*'s technology editor, Dan Lavin, and I milled around in the hallway at the Meridien, we ran into Stewart Alsop and stopped to chat. Alsop talked about Go's risky decision to build a new pen-based operating system from the ground up, contrasting it to Microsoft's safer strategy of building one within Windows 3.0. I thought: From Microsoft's standpoint, it doesn't matter if it's jerry-rigged under Windows; pen-based computers need to be compatible with the installed base of DOS machines. From Go's standpoint, however, the world needs to move forward, so Go stuck its neck out and did something risky. When Alsop talked about object orientation and the embedded document architecture of PenPoint, he didn't mention Go's multitasking, but the issue fits into their strategy. It fits NeXT's strategy, too.

When you use the Go system, you plug your applications into the background, at a layer close to the operating system itself. You don't "launch" programs to do your work. You assemble complex documents that draw on the application resources you've loaded into your notebook. If you have to edit a drawing, you do it right there in the text document, calling up the drawing functionality you've bought to do just that. That's what an embedded architecture is all about. Go's multitasking helps you do this. Let's see Microsoft pull this one off in a Windows environment.

But I'd gotten this message before. The NeXT is just such a multitasking system and understands embedded architectures. It always has. When *NeXTWORLD*'s managing editor first sent me a NeXTmail message with an enclosed WriteNow document for my inspection, I just double-clicked on the document icon in the message window. The NeXT launched WriteNow in the background so I could read the document, an article from an author who uses a Mac. (We translated the document over our GatorBox via RTF format.) The operation can also be used for spreadsheets, graphics, and sound documents, while enclosed TIFF documents don't even require a click: they're already displayed. (For more about the GatorBox and NeXTmail, see our review in this issue.)

Point #2: Full-powered, embedded architectures can only work well in a multitasking environment.

I'd gotten the message, too, when I saw how the Services menu works for interapplication communication. (The Services menu is a NeXTstep "speaker/listener object," in which one program speaks and another listens without having to know who's speaking or listening.) Let's say you receive a fax over the system, which you'd like to pull into your work stream of editable text. All you have to do is pull up OCR Servant from the Services menu and scan the bitmap of the fax. Voilà. Editable text. Or, let's say you want to turn your text into a fax. You can. With the current Mac system, you need to build links into your program. With NeXT's Services menu, programs don't have to know what other programs are doing to establish links between them. All this is possible because of NeXT's Mach kernel, which supports a mechanism for interprocess communication, and its object-oriented environment. You can expect other "objects" to be plugged into the NeXTstep environment in the future.

Point #3: Seamless groupware can only be developed effectively in an object-oriented environment. And NeXTstep is the best object-oriented environment in the world.

And so why am I making all this fuss about a notebook computer in a magazine devoted to the NeXT workstation? Because together they represent a total solution for the same professional markets. People are free agents who also work in groups. The point here is that Go and NeXT don't have *competing* operating systems, but *complementary* ones. Together, they represent innovative solutions for the future, not hacks to the past.

Which brings me to my final point. NeXT needs to leverage its alliance with IBM and its kinship with Go to keep Microsoft from monopolizing these markets. Go should build links to the NeXT environment for seamless interpretation cooperation. Or maybe the next step for NeXT is to develop their own pen-based NeXTstep interface for a notebook computer that can use both a pen and a keyboard, one that they themselves design. A black one, preferably. I'd buy one tomorrow, and when in the office, I'd keep it right next to my Cube.

Michael Miley *is editor in chief of* NeXTWORLD.

NeXT Ink/Dan Lavin

There is a new and growing market for microcomputers called professional workstations, and NeXT is poised to take advantage of it. A professional workstation (PW) is nothing more than a high-end PC. Its users are people who need a great deal of power—not just MIPS power, but power in multiprocessing, power for group computing, and access to powerful applications. NeXT's software and its mode of distribution give it the potential to be dominant in this market.

The professional workstation is defined by its users. Although there are many types of PC users, a potential PW user is anyone who uses a computer for a critical application that benefits from additional power. This cuts an incredibly wide swath in the PC landscape. Right now, obvious resource-hungry tasks such as publishing, university research, and financial analysis fall into this category. But the PW's destiny is not confined to these specialized vertical markets; early adopters of this advanced technology presage a far wider market.

The key here is to understand that the professional workstation is not a traditional workstation. That beast, powerful though it is, is a specialized machine designed for science and engineering needs. PWs are general-purpose machines. They are and will be used by a wide variety of users. Anywhere an improvement in a person's productivity justifies an increase in computing power, that person is going to want a PW, especially now that NeXT has lowered the ante to $5000 retail.

This general market is both large and important. IDC Research shows that the growth rate of PC sales overall is leveling off. Nevertheless, IDC estimates that rapid growth will occur in limited segments, including workstations and laptops. IDC also predicts rapid growth of UNIX-based machines. A full half of these UNIX installations will be commercial, and not science or engineering, sites.

Translate commercial UNIX into professional workstation. Literally millions of these machines may be sold over the next several years. Remember that people entering the PC market for the first time these days tend to buy systems near the top of the performance curve, not the bottom. In today's world that means a '386SX running Windows 3.0, by and large. Tomorrow that will mean a PW, and that PW might very well be running UNIX.

But a UNIX box, up until now, was a hard sell simply because the machine was tough to use. Though Sun has sold many workstations, it has sold only an estimated 40,000 units in its entire history into commercial (not science or engineering) markets—the PW market. Estimates are that NeXT will ship between 50,000 and 100,000 units this year alone, based simply on the fact that over 25,000 have already been ordered.

The NeXT fits our definition of a PW. It is first and foremost a powerful PC. It was designed to be used by average users. It is a generic base useful for any number of purposes. Furthermore, as a UNIX-based machine it is multitasking—you can run more than one process or application at a time. It's geared for use in workgroups over a network. And finally, the NeXTstep environment breeds better applications. (See the feature "Station to Station" in this issue for a comparison of the NeXT '040's capabilities with those of the Sun SPARCstation 2 and the Mac IIfx.) NeXT's competitive advantages, the most notable of which are software and distribution, stem from these attributes.

Commercial applications. NeXT's commitment to interpersonal computing is based on the engineering that went into its machine, which made it particularly well designed to augment the power of groups. NeXT is doing this by attracting mainstream software developers to provide off-the-shelf commercial applications for general use. (NeXT has garnered more than 1000 registered NeXT developers to date.) Four of the six largest PC developers—Lotus, Adobe, Word Perfect Corporation, and Ashton Tate—are developing for the platform. Sun, a traditional engineering workstation vendor, has been largely unsuccessful in this mainstream arena because a developer writing a word processor, database, or spreadsheet program wants to aim at a general audience, not the small group of specialists generally associated with the use of of such workstations.

Furthermore, as more general applications are built into the NeXTstep development environment, it will be clear that they're smarter, better, and faster than their DOS or Mac counterparts. Programs like Lotus Improv, written to take advantage of the high-speed processing and superior graphics of the NeXT, will set new standards for professional workstation applications. They'll work well with other applications, taking advantage of NeXT's Services menu to access other applications like Webster's or OCR Servant. They'll exploit multitasking, interpersonal computing, and UNIX.

Apple has been a real champ at attracting mainstream applications, but several problems may hamper it from gathering its share of newer, smarter, more powerful apps. Apple is truly hidebound by the Mac operating system; future operating system releases must be compatible with the large base of Mac software and at least a majority of existing Macs. The large installed base, which made the company so solid, has become a chain around Apple's neck. Difficulties surmounting this problem are making implementing even the limited multitasking of its System 7.0 a long and tortuous process. In addition, applications written for the Mac must also work, by and large, on most of the installed machines, lowering the common denominator the developer can assume for raw hardware power.

Custom development. But commercial developers don't make up the whole story. Corporate developers as well as vertical-market consultants and VARs will be a large and important part of NeXT's competitive advantage in software. I'm talking here about VAR applications built from scratch. Examples include video-store management systems and front ends for large medical diagnostic machines. With NeXTstep, they've got the best environment around for custom application development.

Custom software has always been a major activity in American business. This is not a new development. Most large mainframe packages are designed to be modified and customized by companies. But the NeXT will provide another kind of custom-made software: a core product sold commercially that can be customized by a consultant or the developers themselves. A successful example of this is the custom system for the NeXT written by Adamation for the William Morris Agency, featured in "The Star System" in this issue. Building on the core of Who's Calling?, Adamation has left open multiple hooks for custom developers to hang specialized applications on. Instead of just a general package for client-contact management, you have a client-contact system tailored for a talent agent.

Developing a user interface in NeXTstep requires a modest investment of time and a short learning curve. The object-oriented environment allows for easy connection to the system's and other programs' resources. This frees the customizer to develop more expertise in solving the problem at hand, rather than spending all his or her time becoming an expert in programming. Equally important, however, is the ability of a NeXT customizer to develop rapid prototypes and reiterations. For the first time in microcomputer history, the client is a true member of the development team because the ease of using NeXTstep and the rapid turnaround time makes user input feasible. These advantages help produce excellent custom apps and give the client significant savings of time and money through shorter development cycles.

NeXT thus has a clear advantage over Sun and Apple. While Sun has always used custom applications as its calling card, its environment suffers because of its original design. Since Sun development is more natural in science and engineering, the development environment was not planned for a general audience. And because Sun built its development interest around UNIX, it is extremely vulnerable to those that add even more value to UNIX—such as NeXT.

Apple has tried to enter this market as well. Since the normal Apple development environment was too difficult and long term for rapid custom development, HyperCard was pressed into service. HyperCard was originally designed as an end-user tool. Putting HyperCard to work for corporate development meant using it primarily as a front end to more powerful applications. Though it has had some success in this area, users often bump up against the limits inherent in its original design. Again, the Apple PC, also known as the Macintosh, struggles against a ceiling that obstructs its entry into the PW market.

Selling into new markets. When all is said and done, however, NeXT's third competitive advantage will be distribution. Because the NeXT is a PC at heart it will be distributed like a PC, unlike some of its competitors. After distribution was discussed in our last issue, NeXT announced a new and expanded retail strategy. In addition to BusinessLand, Computer Attic in California has been authorized to sell the NeXT. Steve Jobs has publicly acknowledged a strategy that will use many independent dealers of NeXT products. This is both good news and a natural development—a PC should be generally available and especially available through retail stores. Further, NeXT software and peripherals are appropriate for mail-order mass marketers like NeXT Connection. These points are important because only through wide distribution can a PC be widely sold. The professional workstation will be the next natural product for the extensive computer retail infrastructure that is already in place around the country.

By contrast, the Sun is sold primarily through its direct sales force. That means of distribution is effective only for large accounts. Sun misses a whole universe of small purchases that make up an important part of the PC market and will be crucial in the PW market. Though Sun is moving to correct this situation, the Sun is inherently difficult to sell at retail because of its complexity.

The professional workstation market will be coming of age over the next several years. Unlike Sun, NeXT has the basic tools necessary to produce a machine for the masses. And unlike Apple, it has the power necessary for professional corporate use. It also holds a strong competitive position over both Sun and Apple with its system software and its potential for top-notch custom and mainstream applications. In short, NeXT is in the right place at the right time with the right products.

NeXT Ink *focuses a sharp eye on NeXT and its impact on the professional workstation market.*
Dan Lavin *is technology editor of* NeXTWORLD.
He can be reached at 415/978-3186 or e-mail dlavin@nextworld.com.

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NeXTWORLD Interview: Al

The authors of *Future Shock, The Third Wave,* and *Powershift* talk about the impact of technologies—and predict new ones.

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Alvin and Heidi Toffler

The genesis of Alvin and Heidi Toffler's lifework can be found in their article entitled "The Future as a Way of Life," which appeared in a 1965 issue of *Horizon* magazine. Here they examined the need for long-range future planning in business and government and coined the term *future shock* to describe the disorienting potential of high-speed changes that were right around the corner. When the Tofflers detailed that new world of social and technological change in their 1970 book *Future Shock*, they instantly became international celebrities. Selling 7 million copies in 30 languages, this book became the starting point for discussions of our global future and the foundation of their futurist trilogy rounded out by *The Third Wave* (1980) and *Powershift* (1990).

Although Alvin Toffler is credited as the sole author of their many works, he insists that his wife, Heidi, has been his "unacknowledged coauthor" from the beginning. For 40 years they have lived, traveled, researched, and written together. The trilogy is the culmination of their research and thinking that began when they met at New York University in 1948.

After college, convinced that they needed "graduate study in reality," they moved from New York to the Midwest and spent five years experiencing America's smokestack industries firsthand. Alvin worked as a metal finisher on an auto-assembly line, operated a punch press, and became a millwright in a steel factory. Heidi made aircraft parts in an aluminum foundry, served as shop steward for the United Auto Workers, and helped organize protests against racial segregation. The Tofflers also began writing about these blue-collar experiences.

In the late 1950s, Alvin became a newspaper correspondent in Washington, D.C., for a Pennsylvania daily, covering Eisenhower's presidential press conferences and House and Senate hearings on everything from disarmament to antitrust problems.

After Alvin had covered labor issues as an associate editor for *Fortune* magazine for three years, the Tofflers were asked to write a white paper for IBM on the long-range organizational implications of the computer and white-collar automation. This was followed by a study on information retrieval for the Educational Facilities Laboratories, which sent the Tofflers around the country interviewing researchers in the field of artificial intelligence. Xerox Corporation hired them to prepare a paper describing advanced work on imaging technology. Research for a foundation study of the economics of the arts in America became the basis for their first book, *The Culture Consumers* (1964).

Since the extraordinary reception of *Future Shock*, the Tofflers have spent increasing amounts of time meeting with world leaders and studying the influence of technological change internationally. Other books include *The Eco-Spasm Report* (1975), *Previews and Premises* (1983), and *The Adaptive Corporation* (1985). In 1986, they joined James Baldwin and Arthur Miller to establish the first non-Communist, nongovernmental organization in the Soviet Union, the Issyk-Kul Forum, an international assembly of intellectuals that discusses social and economic questions.

Future Shock, The Third Wave, and *Powershift* interrelate and repeat ideas in different forms. *Future Shock* looks at the process of change. In it the Tofflers argue that the acceleration of history by technology will bring us out of the smokestack culture much faster than industrial machinery brought us out of the agrarian culture, and that the process will require major social and economic adjustments. *The Third Wave* deals with the specific directions that process is taking us and how developing industries based on computers, biotechnology, and new electronic media will affect future societies.

Powershift argues that we can no longer cling to outdated power structures of brute force and monetary wealth in the information age and presents a theory about who will control the process of change in the future. Within this theme, the Tofflers explore the central role that the computer will play in every aspect of our future lives. This is what we asked them to discuss with us.

The Tofflers were interviewed by Digby Diehl, daily book columnist on the Prodigy computer network, regular contributor to *Playboy* magazine, former book editor for the *Los Angeles Times*, and author of *Supertalk*.

"There is the beginning of a whole new techno-political fusion of technology and politics. It's a fundamental historical change."

—Alvin Toffler

NeXTWORLD: How do you see the computer itself changing?

Alvin Toffler: The computer is being embedded in everything: in our automobiles, in our steam ovens, and in our factories. It is the ultimate tool of the age, and for this reason, the social impacts are ramified widely, and sometimes are contradictory. We've always said that we still think of computers as plastic or metal boxes with keys on them and a metallic or technical feel about them. Computers in the future are going to be friendly, customized for each individual. And I believe—and perhaps Heidi will shudder at the thought—that they will be implanted inside our bodies.

Heidi Toffler: I do shudder at that thought.

AT: I think that they will not only be implanted to compensate for some physical defect but eventually will be implanted to enhance human capability. The line between human and computer at some point will become completely blurred.

NW: Before Heidi pooh-poohs this idea, let me pursue it for a moment. It's a very exciting idea.

AT: It's a frightening idea as well. We're going off into the realm of science fiction a bit. Imagine people going around with microprocessors or tiny little computers inside them and then somebody spreads a virus. We can imagine all sorts of strange permutations of all of this, but it seems likely that we will move in this direction—and that it will have, like everything else, both positive and negative effects.

HT: It adds fuel to the fire of those people who hate technology and who want to go back to an idealized pastoral past, which never existed in the first place. It is the ultimate threat of combining technology, which they hate, with human beings. But I don't see that this is going to happen. What I see the computer being used for is just a part of your everyday life.

Just think: Ten years ago, who would have conceived of faxes all over the place, and cellular car phones? I think the same thing is going to happen with the computer. You're going to be able to talk to it. And you're going to be able to ask it to remember things or to do whatever you want done—your bookkeeping, your bank statement.

AT: A computer is going to become more like a television set. And a television set will become more like a computer, in every size, from hand-held to Wall Street mainframe. As I say, they are going to perform many, many things, although you will need fiber optics for interactivity. For example, the French government has distributed 5 million terminals, called Minitels, to people to use in lieu of a phone book, but there are 10,000 uses that you could access through this little terminal, whether its banking, or e-mail, or communicating with friends. Your house is not going to have a television set—it's going to have maybe a dozen television sets. It's just a question of whether we're talking about 5 years or 10 years or 20 years.

NW: The changes are so rapid, it's hard to keep up. When I rush out and buy my first telecomputer, will it be obsolete in six months? We've heard about planned obsolescence in cars, but now we're talking about ideas.

AT: Yes, here the obsolescence has gone from the hardware to the software. What's happening is that some of the machines are becoming overfilled with bells and whistles that we don't need for a particular job. What will happen is extreme customization; no two computers will be the same. We're going to have machines so personalized that they respond to *our* voice but not to somebody else's. Computers will have learned our every little idiosyncrasy. They will know that we characteristically mistype *square* as *suqare* and will automatically correct for that. They will have learned what we order for lunch. They will be our alter egos. The idea of commodity computers, which are the same for everybody, will become passé. Some may be useful for certain industrial purposes and functions, but at a personal level—the ultimate end toward which we are heading—will be machines that can learn and get to know us and, therefore, serve us in highly individualized ways to such a point that we'll be serving them!

NW: You don't seriously think we'll get to the point where we'll be serving them?

AT: Well, I don't think we're stupid enough to allow things to go to that point.

NW: What happens when we begin to take the ubiquity of the computer for granted?

HT: We tend not to think about the secondary or tertiary effects of any technology introduced. Take the example of the automobile, which has tremendously altered society. Just the given fact of mobility altered the way people lived. But when we started using cars, we never thought of that. It changed people's sex lives, it changed their family lives, it changed their working habits, it changed the way they organized cities.

NW: Already the computer has begun to do that.

HT: Yes. We're shooting a show on *Powershift* for Japanese television, and one of the countries we shot in was Israel, where there is a cutting tool factory that doesn't have a single worker in it. Even the machines get their parts from a robot that goes from machine to machine and resupplies them.

AT: Imagine a vast library with stacks three or four stories high and a robot that selects volumes and plugs them into different machines; that's what they have, in effect. It is truly startling. One factory could do something like make a measurable fraction of the world's supply of cutting tools. What's really interesting about this experiment is it's being run by a visionary father and son who see their function not as making cutting tools for the world, or profits. Their primary purpose is social—to develop the region around them, the Galilee region.

> **"We are now deep into the stage of what we call cultural technology, in the sense that these machines, these new generations of computers, affect culture at the deepest levels."**
>
> **—Alvin Toffler**

They've started what they call an incubator community, in which people with ideas for new products come to them. They will help these tiny little companies get started. The idea is to build a community that will be economically viable, that will be a major export platform for this tiny country that doesn't have a large internal market. And, hopefully, one in which Arabs and Jews will work together. It's a breathtaking vision based on the application of computer-driven technology.

NW: Let me ask the question that always comes up when you talk about robotics. What do the people do?

AT: The company employs several hundred people all told, and they are mostly technical specialists or they are tracking invoices; they are businesspeople.

> **"We will be a great manufacturing nation, it's just that we won't need very many people to do the manufacturing."**
>
> **—Heidi Toffler**

HT: Stop a minute and think about today in the United States, how many people actually handle physical goods. Al and I both worked in factories for five years. Most of those jobs don't exist anymore. The light bulb factory that I worked in, I am absolutely convinced, is now totally automated. There was no need for a human being to do the kind of dehumanizing work that I did for a year. I held a bunch of filaments in one hand and a tweezer in the other, and I filled slots that are the equivalent of gas jets. It made me into a robot. I'm grateful that kind of job is gone.

AT: When we were at the White House, we met with former President Reagan, Chief of Staff Regan, and Bush. There was a group of us futurists sitting around. Regan said, "Oh, what you people are saying is that America is not going to be a great manufacturing power anymore. That we're all going to be clipping each other's hair and shining each other's shoes." Heidi said, "No, you're wrong; we will be a great manufacturing nation, it's just that we won't need very many people to do the manufacturing."

The outlook and long-term direction is clear: People with highly developed skills and backgrounds will get paid more and more and more, and will work under better and better conditions and have more power vis-à-vis their own managements. On the other hand, people with inappropriate skills will find it harder and harder to gain even a foothold in the economy. This is a polarization that is very dangerous.

NW: Our society, to a large extent, is already split as you describe. In your estimation, will the computer make a dent or make a difference?

HT: It depends on how the computer is used. If it's used as an adjunct to the rote and repetitive kinds of learning that have occurred in the schools in the past—in order to take standardized multiple-choice tests—then the computer is almost irrelevant, or even destructive, in the classroom. But if it is used to teach people to think better, or to think at all, then it's a valuable learning tool.

AT: We don't teach skepticism [in the schools]. A degree of skepticism is healthy for a normal society, and particularly for a computerized society. This takes us to the theme of *Powershift:* Those in power have always used information games, propaganda, lies, secrets, deception to stay in power, and it's certainly true today. What's new is the introduction of the computer.

The computer, on one hand, provides citizens with fantastic amounts of hitherto secret information. But at the same time that there's more data available, the games have become more sophisticated. Now political policymakers fight over not just the facts of the situation but the scientific models being used to decide the questions. So, for example, [presidential advisor John] Sununu can question the computer-generated models being used to state the conclusions. Senator [Albert] Gore, on the other side, can also question the validity of the model. Suddenly what's happening is policy is being fought over at the meta-level of models. Is the model good? Is the model bad? Most people don't know what a model *is!*

NW: Something Heidi said early on is germane to what we've been discussing about education, politics, and so forth—that the form of the computer is going to change to allow a more accessible interface, that the human interface will reach the point of responding, say, to the question: What is this model Sununu is talking about? and then referencing different data and explanations about what a model is and other background information.

AT: Imagine a political system in which candidates submit an interactive disk to you that you put into your television set. It asks if you want to see candidate Brown (a) deal with a crisis, (b) reorganize the bureaucracy, or (c) make tradeoffs on taxes. You press button A and see a dramatized crisis in which he is compelled to make decisions. But you have the capability of changing the terms of the crisis, so that you can actually see how he might respond. You form your own judgment about whether this candidate is capable of coping with a significant crisis. With this kind of technology, the politics of the future could be fantastically different from anything we know today. There will be incredible political technologies coming down the line, all of them impossible without computers.

The other thing that needs to be said about computers is that we're past the stage of information technology. We are now deep into the stage of what we call cultural technology, in the sense that these machines, these new generations of computers, affect culture at the deepest levels.

For example, automatic translation. When you begin making languages transparent to one another, you make a given culture open to input from an outside culture in ways that are very subtle but that can have enormous long-term implications. But individual technologies don't do much by themselves. You've got to see them in relation to other technologies, seeing automatic translation, for instance, in relation to satellites—cheap satellites in which the electronics are the size of a pack of cigarettes. When you connect these widely available satellite dishes with automatic translation, you, in Silicon Valley or Patterson, N.J., are going to be bringing in television programs from Guatemala, Nigeria, Patagonia, India, from all over the world, and in a language you can understand.

Even things like producing a word processor that you talk to and that prints out your words. We know how to do it, it's just a question of cost. When this is widespread, we will begin to reduce the requirements of literacy.

HT: I've thought a lot about this, and I'm not sure what effect illiteracy will have on the world. That, to me, is one of the most fascinating questions of the future. For instance, we were in Egypt recently, and the Egyptians don't allow the word *secular* to be used. Now, if you don't have literacy and you don't use certain spoken words, you don't use those concepts. Now what do you do to a society if you eliminate concepts and words and all the people are illiterate?

AT: I think it's not just a question of literacy but of a change in the function of literacy. The Egyptians may eliminate the notion of secular from their language, but when those satellite translations come in from outside, these people are going to see things coming right in from Beverly Hills—and then they're going to know what *secular* means, for good or for evil.

Many jobs that today depend on literacy may no longer depend so heavily on it. I'm thinking of an airlines reservations clerk. The day may come when the computer provides a great deal of the information required by the clerk to do the reservation. Maybe it provides iconic images rather than just words.

NW: But none of this is possible without computers.

AT: And without the democratization of computers, which was introduced by the original Apple. What I mean is that computers are no longer giant monsters kept in a sealed room with white-coated guardians. Freed from this, they spread throughout the company and throughout society. It's not just governments and companies that can afford these things. We also know that computers and computer networks are being used by all kinds of protest groups, from the Ku Klux Klan to the far Left. So there is the beginning of a whole new techno-political fusion of technology and politics. It's a fundamental historical change.

HT: One of the big social and psychological questions of the future is a values question of how we prefer to be changed or not to be changed.

AT: All of the things that were science fiction have become at least mechanically possible. In the past, when technological options were few, societies generally chose their technologies based on one of two questions: Is it something people want and could you make a profit off it? or Does it enhance military power so that the state wants it? Today, there are so many alternative technological options flooding out of our laboratories around the world, it is impossible for us to fund them all, and we need far more constraining criteria for their selection. The technological questions go beyond the bang and the buck. They need to be shaped by social input.

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GET INTO NeXTWORLD!

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Linda G

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Gordon

Jim San

Profile: Adobe on Display

*In the **top photo,** John **Warnock** (in **jacket)** confers **with** Adobe **developers** (clock**wise from top left)** Bob **Wells, Chris Hunt,** Linda **Gass,** John **Carnes,** Gordon **Hamachi, and** Jim **Sandman.***

Together, Adobe and NeXT bring true WYSIWYG to the screen.

by Elizabeth Weal

The company that invented PostScript and played a critical role in the early acceptance of the Macintosh has also taken on a significant role in the future of the NeXT. Adobe Systems pioneered Display PostScript—the imaging model that affords users true WYSIWYG (what you see is what you get) display capabilities—which first appeared on NeXT computers. Soon, Adobe will also bring over its popular illustration application, Adobe Illustrator.

The PostScript page-description language has become a de facto standard for electronic printing and publishing. More than 100 PostScript output devices are available, including black-and-white printers, color printers, typesetters, film recorders, and video production systems, with support for these devices provided by more than 4000 software products. In addition, Adobe's Illustrator and PhotoShop have earned the company a reputation of being a leading developer of graphics software, primarily for the Macintosh platform.

Joining forces. The cooperation between Adobe and NeXT is illustrated by the story of how Jack Newlin, a software engineer at NeXT who played a key role in implementing Display PostScript, got his job. In 1986 Newlin, who had been working at Xerox Palo Alto Research Center (PARC) for almost ten years, visited Adobe to meet with some former colleagues from Xerox—including Adobe cofounders John Warnock and Chuck Geschke—and to ask about the possibility of a job. Adobe told him that his work at Xerox on Interpress, a language similar in many respects to PostScript, made him ineligible for employment.

"They said, 'We'd be risking a lawsuit if we hired you,'" Newlin recalls. Warnock did, however, ask Newlin if he'd be interested in learning more about a start-up that was doing interesting work. Newlin said that he would. An hour later, when Newlin was back in his office at Xerox, the phone rang. The voice at the other end announced, "Hi. This is Steve Jobs."

Newlin met with Jobs and soon became an employee at NeXT. His first project was working with software engineer Leo Hourvitz to integrate Display PostScript into the NeXTstep environment.

Adobe and NeXT joined forces to develop Display PostScript on the NeXT soon after Steve Jobs had founded his new company in 1985. However, the history between Jobs and Adobe goes all the way back to the initial stages of Macintosh development, when Jobs abandoned development of a letter-quality dot-matrix printer inside Apple and chose, instead, to develop a PostScript printer in conjunction with Adobe.

Together—with the important link of Apple's LaserWriter printer—Apple and Adobe prospered. The high-quality output available from PostScript printers was a key factor in winning the Macintosh its coveted position as the pre-eminent desktop-publishing platform—which essentially created a whole new market for microcomputers. Adobe, in turn, received 80 percent of its early revenues from sales of the LaserWriters.

It's not surprising to find that when Jobs started NeXT, he turned to Adobe. "I think we have a similar view of the world and similar goals and aspirations, so it's hard to imagine not working closely with Steve," says Warnock. But Warnock's decision to support the NeXT is based on more than personal compatibility. "The NeXT really is a very strong indication of where the industry should go," he states.

Displaying talent. When Adobe began licensing PostScript, the technology was used exclusively for describing output from devices such as printers and typesetters. NeXT was the first company to license Display PostScript, an extension of PostScript that defines what appears on the screen.

The notion of using a machine-independent graphics language like Display PostScript to drive a monitor actually predated the implementation of a device-independent rendering language on printers. In the mid '70s, while Warnock was working at Evans and Sutherland, he designed a device-independent graphics language for use in an application for teaching ship pilots how to steer through New York Harbor. When he later worked at Xerox PARC, he implemented a similar graphics language, called JAM, that was also screen-oriented.

The graphics available on the minicomputers that Warnock used at Evans and Sutherland, and at Xerox PARC, were not possible on the Macintosh. The original Macs had neither the power nor the speed necessary to drive a display with such a complex language. (The Macintosh screen-imaging language is called "QuickDraw.") It was possible, however, to install the computing power required to generate PostScript output into a printer.

"Jobs's experience on the Mac made it clear that it is beneficial to have the same imaging model on the display as on the printer. So, when he founded NeXT, he knew he wanted PostScript for his display, in addition to having it for his printer," says Linda Gass, engineering manager of Display PostScript at Adobe.

"It's a real problem for application developers who develop in an environment like the Macintosh or Windows to have one graphic-imaging model drive their display and then need to go through a tedious process of translating the graphics that they've used for the display into what the printer is going to understand," explains Gass. The translation causes a headache for users, too, who must wait out the processing time before the printer spits out a page. And even then, the result may not be exactly what they expect. "It's like trying to translate French into English; it's possible to do it, but it's hard, and the meaning is often lost in the translation," Gass adds.

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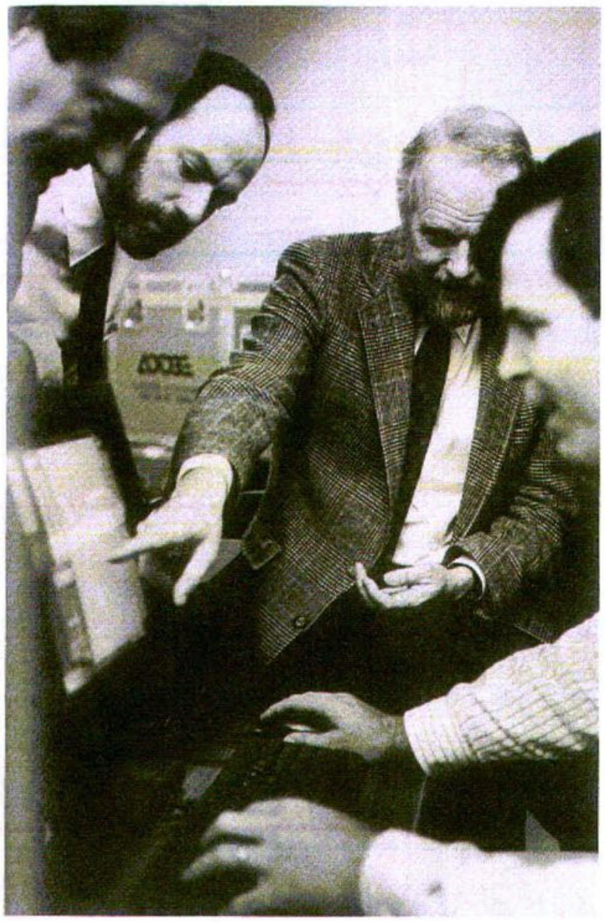


Adobe Systems

Location: Mountain View, California

Founded: 1982

Revenue: Fiscal 1990: $169 million

Employees: 500

Product: Display PostScript, an implementation of PostScript that provides true WYSIWYG on the NeXT display

Time in development: Two years

Number of engineers on development team: Fluctuated between four and eight

Current projects: A NeXT version of Adobe Illustrator

According to Gass, two factors contributed to Adobe's decision to implement Display PostScript on the NeXT. First, workstation hardware had evolved to the point where it was practical to develop an interactive PostScript interpreter to drive the display. Second, Adobe had a customer. In the combined Apple-Adobe effort to develop Display PostScript for the NeXT, Adobe's task was to extend PostScript so it could handle imaging in an interactive environment. NeXT's role was to integrate Display PostScript into the Window Server of the NeXTstep system software and to provide Adobe with ongoing feedback about Display PostScript's performance.

The terms of the joint development effort between Adobe and NeXT were laid out in a contract that stipulated, among other things, that the developers were not permitted to view certain highly proprietary parts of each other's source code. Both sides agree that the development effort went smoothly and that the two teams complemented each other well, although the "secret sources"—as they came to be called—made things a bit dicey when it came time to debug.

"Sometimes a bug in their code would only be in evidence in our version, so it would be hard for Adobe to find the bug in the privacy of their own facility," Newlin recalls. In such cases, Adobe engineers had to go to NeXT headquarters, secret sources in hand, and attempt to reproduce the problem there.

Newlin and Hourvitz did most of their development work at NeXT, but they spent ten weeks at Adobe during a critical period in the project. Because NeXT wanted to keep all specifications about its new machine under wraps, Newlin was instructed not to tell outsiders of his whereabouts. "I remember riding my bicycle to Adobe from my house one day, when I saw an old colleague. It was an odd direction to be riding my bike, away from my house. We didn't stop and talk, but I waved to him and went on and thought, 'Hmm. I wonder what my excuse is for riding in this direction.'"

Adobe's cooperation with NeXT led to other victories for the company. Many of the enhancements that Adobe added to PostScript to create Display PostScript were incorporated into PostScript Level 2, a PostScript extension announced last June. Other enhancements in PostScript Level 2 include support for device-independent color, forms and patterns, and composite fonts (like Kanji, a font with large character sets); data and image compression; and performance improvements.

Other platforms. Some day, workstation users will take for granted that what appears on the screen is identical to what prints out on the printer. Today, however, it's still common to find discrepancies between the two. From a user's perspective, the benefit of Display PostScript is that it guarantees consistency. The NeXT's electronic fax also transmits in PostScript code, which produces output that is far superior to output from a scanned fax document.

> **"We did Illustrator for the NeXT for the same reasons we did Illustrator in the first place. On the Macintosh, Illustrator is a useful tool and demonstrates the power of PostScript on PostScript printers. On the NeXT, it's a useful tool and showcases PostScript on the display."**
>
> **—Jim Sandman**

Several companies besides NeXT license Display PostScript from Adobe. Digital Equipment Corporation, for instance, distributes it with all Ultrix (DEC's version of UNIX) and VMS workstations. IBM supports it on the RS6000 (IBM's RISC workstation). Silicon Graphics recently announced plans to license it, too. NeXT is the only system, however, that has implemented Display PostScript from the ground up.

Warnock compares the Display PostScript implementation on the NeXT to the implementation on Motif, the Open Systems Foundation's user-interface standard. "Display PostScript under Motif is sort of an adjunct graphics package. You can use the Motif graphics package, or you can use Display PostScript," he explains. "In the NeXT machine, it's all integrated very tightly and consistently." On the NeXT, Display PostScript is fully integrated throughout the machine's operating environment.

Illustrator. Adobe's links with NeXT continue, as Adobe brings its Illustrator software to the platform. This key addition to NeXT's software offerings—an anchor in the desktop-publishing portfolio of the Macintosh—is scheduled for delivery this quarter.

"We did Illustrator for the NeXT for the same reasons we did Illustrator in the first place," says Jim Sandman, a member of the Display PostScript development team. "On the Macintosh, Illustrator is a useful tool and demonstrates the power of PostScript on PostScript printers. On the NeXT, it's a useful tool and showcases PostScript on the display."

Developing Illustrator for the NeXT was also a financial consideration. If Illustrator is successful on the NeXT, Adobe will profit in two ways: direct revenue from Illustrator, plus indirect revenue from the increased sales of the NeXT that the presence of this key software is bound to initiate. Adobe receives royalties from the Display PostScript license.

Four programmers make up the NeXT Illustrator team. Original team member Bob Welles becomes exuberant when he describes the NeXTstep development environment. "It's wonderful," says Welles, sporting a grin reminiscent of a kid who has just been handed a stack of rare baseball cards. "People who developed the NeXT windowing system knew what was wrong with the Macintosh windowing system and then went on to solve all its problems. The result is a more powerful system. I mean power in the sense of how much a call to the windowing system will accomplish. On the Macintosh, you have to write a lot of code to do very simple things. On the NeXT, you write less code to get the same amount of work done."

Welles cites the example of creating scrolling windows, a process that, on the Macintosh, requires developers to go through several tedious steps. On the NeXT, all one needs to do is define the scrolling window and its contents. "When you create a high-level scheme like that, you're really taking the risk that you're going to prevent someone from doing the thing they need to do. But NeXT has thought things through well enough so that that doesn't happen," he says.

Adobe began developing NeXT Illustrator on the NeXT computer about two and a half years ago. During the relatively long development cycle the team has been redefining the program's user interfaces so that they can easily be ported to a variety of platforms and user interfaces, such as Microsoft Windows and Sun Microsystems' X Windows.

The work has been complicated because the original Macintosh Illustrator source code, Illustrator 88, changed substantially during the course of the project, culminating in the release of Illustrator 3 for the Macintosh at the end of last year. New features in Illustrator 3 will appear in the NeXT version, including the ability to include arbitrary-length text blocks with any mixture of typographic styling, to fill any sequence of shapes with type, and to place type along a path. In addition, Illustrator 3 promises editable font outlines, an easier-to-use user interface with more feedback to the user, alignment aids, a graphing tool, and a direct select tool that permits selecting and manipulating portions of groups without ungrouping them.

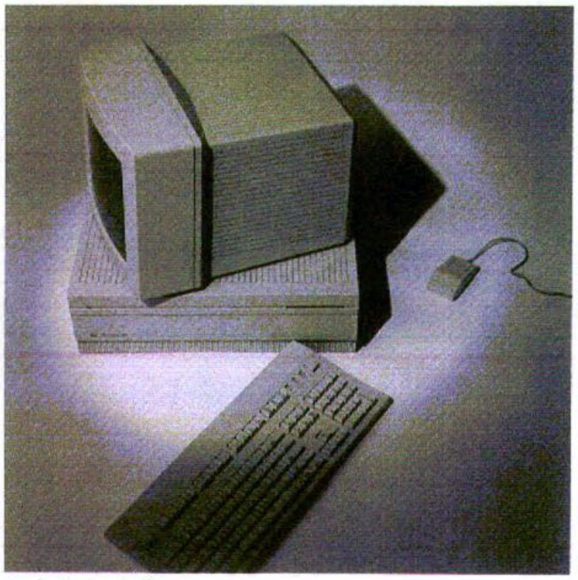
Adobe has not announced any features that will be unique to NeXT Illustrator, but members of the development team say that certain standard features of the NeXT computer—including the large display; grayscale display; and services such as e-mail, fax, and the spelling checker—make the software particularly well suited for the NeXT platform.

On the crest. Despite some gloomy economic forecasts for the computer industry, the mood at Adobe remains upbeat. Some alarms sounded when Apple and Microsoft announced plans to produce a PostScript clone, but the language, called TrueImage, has yet to be adopted by any Adobe customers. Meanwhile, Adobe's revenues continue to climb.

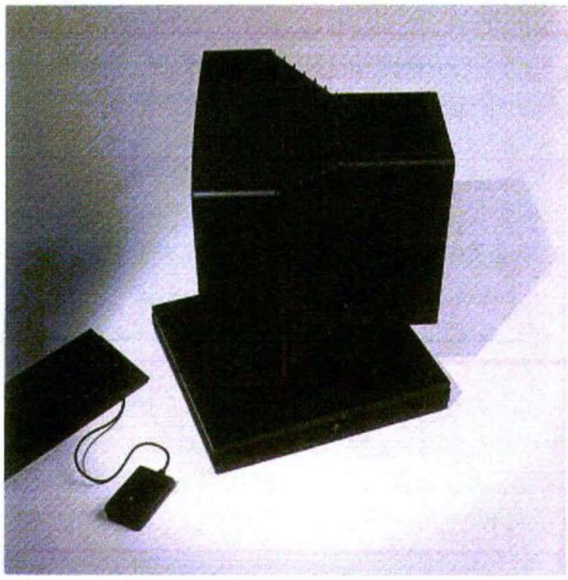
Perhaps most important, Warnock, the company's resident visionary, shows no sign of slowing down. His latest inspiration is to use PostScript as the basis for a kind of electronic paper that is independent of the software on which it is developed. "Communication of documents across platforms is going to be very important in the future. But for that to happen, the document has to be somewhat self-contained so that it doesn't depend on attributes of lots of different operating systems," Warnock says. "You can imagine having a computer-generated document that could go across all different operating systems and platforms and could be viewed on that platform and printed from that platform." With this in mind, it's possible that PostScript may be the ASCII of the '90s.

Elizabeth Weal *is a free-lance writer in Palo Alto, California.*

Station to Station



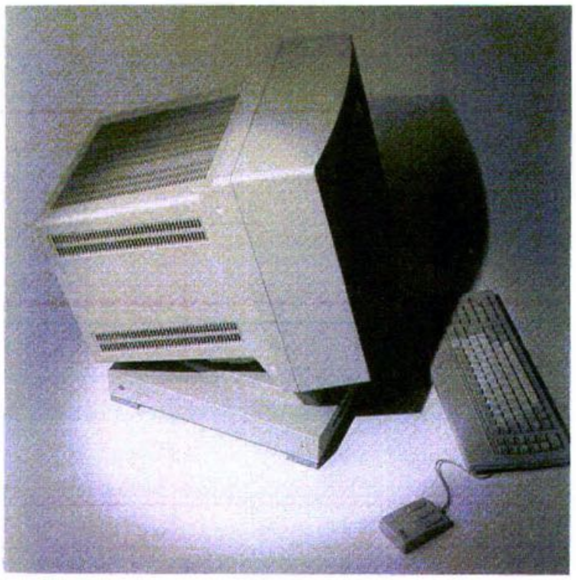
Apple Macintosh IIfx



NeXTstation (NeXT's entry-level '040 machine)

The new NeXT '040 machines square off with the Mac IIfx and SPARCstation 2.

by Edward Jung and Bruce F. Webster



Sun SPARCstation 2

A curious hole in the micro/workstation marketplace has appeared in the last year or two—a gap created by the simultaneous upward reach of Apple's Macintosh product line and the downward thrust of the Sun family of workstations. The two trends don't meet squarely, but rather pass to the side of one another, leaving a space between them. And although some borrowing has gone on between Apple and Sun, that space may have remained unfilled for some time—were it not for NeXT.

The revised lineup of NeXT systems, introduced in September 1990, falls squarely into that breach separating Apple and Sun. The computers themselves—the NeXTstation, the NeXTstation Color, and the NeXTcube (with or without the NeXTdimension graphics board)—borrow the best of their neighbors' attributes, with some enhancements of their own.

With this article, *NeXTWORLD* begins an ongoing series whose intent is to provide a meaningful and hard-nosed evaluation of how NeXT and its computers stack up against the competition. The three platforms we look at here are competing for a market we call the professional workstation market. It includes such people as DTP specialists who need to work intensively with color, engineers who want to use the same computer for their computation-intensive work that they use for their in-house newsletters, financial analysts who want the latest analytical powers of Improv and a customized environment for building links to high-end databases. The group is defined by a need for the highest-powered desktop systems it can get.

This article provides a general overview of three competing products: the NeXT '040, the Sun SPARCstation 2, and the Macintosh IIfx. We're not here to decide for all time which is the "best" of the three systems, a question that is moot outside of a given customer context. We're here to see how representative systems from each company compare in design, features, utility, value, and performance.

ALL IN THE FAMILY

Each of the three product families—Sun, Macintosh, and NeXT—has its origin in a single system based on a Motorola 680x0 processor. For Sun Microsystems, it was the Sun 1, introduced in 1982 and using a Motorola 68000 CPU. Sun was intended from the start to run a version of Berkeley's UNIX, providing a relatively low-cost solution for academic and engineering environments looking for UNIX-based personal workstations. The product line divided in the late '80s: Sun-2s and Sun-3s used 680x0 processors, the Sun 386i's used Intel's 80386 CPU, and the SPARCstation models used a custom RISC (reduced instruction set chip) processor called SPARC (Scalable Processor ARChitecture) for greater performance. At the same time, the market expanded greatly, with Sun placing systems in a wide variety of settings; with a total installed base of some 500,000 systems, roughly half are SPARCstations. During the last year or so, Sun has discontinued the 680x0- and 80386-based systems and is focusing on expanding the SPARCstation product line. Sun expects to sell some 200,000 SPARCstations this year. Of their personal workstations, the newest and most powerful is the SPARCstation 2.

For Apple, it was the original 128KB Macintosh, using an 8MHz 68000 CPU and released in January 1984. Unlike Sun, Apple positioned the Mac as a personal computer, touting it as "the computer for the rest of us." One could argue that, until recently, Apple's pricing policy made it "the computer for the rich of us." But it is also true that the Macintosh opened up personal computing for large numbers of people put off or confused by the arcane nature of most computer systems. The Macintosh product line has grown and shrunk over the years, with several models appearing and then disappearing. The total installed base is roughly 4 million systems. The current Macintosh product line runs from the wildly successful Mac Classic—which uses the same 8MHz 68000 CPU as the original Mac, and which may become Apple's all-time best-selling computer, eclipsing even the Apple IIe—to the high-powered and high-priced Macintosh IIfx.

NeXT introduced its first offering in October 1988 and started shipping it to developers and universities in December of that year, with commercial deliveries starting in September 1989. Combining a high-quality graphical user interface with a version of UNIX, it was, if you will, the first UNIX workstation for the rest of us. NeXT's original market was education, and an advisory board comprising representatives from over a dozen major universities did much to shape the product. The first NeXT system used a 25MHz 68030 CPU, a 25MHz 68882 floating-point processing unit (FPU), and—in a move still unique in the micro/workstation market—a 25MHz 56001 digital signal processor (DSP). Despite all that horsepower—or, perhaps, because it raised people's expectations—the NeXT was criticized for its performance, and sales were slow, with perhaps 10,000 to 15,000 systems delivered.

In September 1990, NeXT replaced the original NeXT computer with a family of three systems, all sharing a similar architecture and nearly identical performance, and all costing a good deal less than the original. The NeXTstation, NeXTstation Color, and NeXTcube all use a 25MHz 68040 CPU (which contains a built-in FPU); the principal difference is that the NeXTcube has three expansion slots, while the NeXTstations have none. Response has been strong, especially to the lower-priced NeXTstations; NeXT expects that the total installed base by the end of 1991 should be between 60,000 and 75,000 systems.

Note then, that for this comparison, we used an '040 NeXTcube for testing and evaluation and for building our specification table on a system equivalent to the other two platforms. For purposes of benchmarks, however, it should be noted that the NeXTstation is nearly equivalent to the NeXTcube in all performance tests that do not involve the NEXTcube's NeXTdimension 32-bit color board—and for $5000 less than the cube.

SYSTEM ARCHITECTURE

Table 1 gives a feature-by-feature hardware comparison of the three systems. Each product represents its manufacturer's attempt to boost performance to the maximum, usually through a combination of processing power, caches, and input/output channels.

PROCESSING POWER

The Mac vs. Sun debate is a classic case of CISC (complex instruction set chips) vs. RISC (reduced instruction set chips). CISC processors support complex instructions that perform a lot of work but can take many clock cycles to complete. RISC processors support simple instructions that don't do much work but take only one or two clock cycles to complete. Common wisdom has it that a RISC processor will beat a CISC processor running at the same clock rate, and that's certainly the case when comparing a 40MHz 68030 with a 40MHz SPARC chip set.

The NeXT's 68040 processor represents Motorola's attempt to close the gap between CISC and RISC. Motorola claims an average cycles-per-instruction rate of 1.3, which it achieves through a high degree of pipe lining (decoding several instructions at the same time) and tight integration of the integer, floating point, and memory management units (all on the same chip). Motorola also claims that a 25MHz 68040 outperforms a 25MHz SPARC chip and is about three times faster than a 25MHz 68030.

To help boost performance, many computer systems include a floating-point unit, a processor that specializes in high-speed mathematical operations using floating-point or real (non-integer) numbers. The SPARCstation 2 has a 40MHz floating-point SPARC processor in addition to the standard CPU, while the Macintosh IIfx comes with a Motorola 68882 FPU. The NeXT, however, has no separate FPU because the 68040 has a FPU built into it. This degree of tight

Table 1

Brief comparison of system architecture

FEATURE	Macintosh IIfx	SPARCstation 2	NeXTcube
Main processor	40MHz 68030	40MHz SPARC	25MHz 68040
Floating-point processor	40MHz 68882	40MHz SPARC FPU	(Within 68040)
Digital signal processor	None	None	25MHz 56001
Chip cache	256 bytes (code, data)	None	4096 bytes (code, data)
External cache	32KB write-through	64KB write-through	None
On-board memory	*1MB to 32MB	16MB to 32MB	8MB to 64MB
DMA and I/O processing	**SCSI DMA support **2 serial I/O processors	Full DMA support	Full DMA support 9 I/O processors
On-board video	No	Yes	Yes
Expansion slots	6	3	3 (+1 for motherboard)
Bus	NuBus (10 MHz)	SBus (20MHz)	NeXTBus (25MHz)
Network hardware	LocalTalk	Ethernet	Ethernet
Maximum transfer rate	230.4 kbits/sec	10Mbps	10Mbps
Connector(s)	DIN-8 (uses serial port)	15-pin	BNC and 10BaseT
PORTS			
Network	(Uses serial)	DB-15 (thick-wire) Transceiver available For BNC, 10BaseT	BNC (thin-wire) 10BaseT (twisted-pair)
SCSI	SCSI (DB-25)	SCSI-2	SCSI-2
Serial	2 RS-422 (DIN-8)	2 RS-423 (DIN-8)	2 RS-423 (DIN-8)
Printer	(Uses serial)	(Uses serial)	Dedicated printer port
Video	None	Dedicated video port	Dedicated video port
Other	Apple Desktop Bus (2)	None	Dedicated DSP port
SOUND I/O			
Input	Third-party hardware	Built-in, 8-bit, 8KHz	Built-in, 8-bit, 8KHz Also, third-party via DSP port
Microphone	None	None	Built-in (display)
Sound generation	Apple sound chip	SPARC (CPU)	56001 DSP
Output	Internal speaker (system) Stereo mini-jack	Internal speaker Monaural mini-jack	Internal speaker (display) Stereo mini-jack Dual RCA line-outs

***Version 6.0.x of Macintosh operating systems limited to 8MB, maximum.**

****Not supported by Version 6.0.x of Macintosh operating system.**

integration allows for higher performance and lower cost. Motorola claims a sustained performance for a 25MHz 68040 of 3.5 million floating-point operations per second (MFLOPS), while Sun claims 4.2 MFLOPS for its 40MHz SPARC FPU. By Motorola's estimate, the 40MHz 68882 in the Mac IIfx should perform at just under 2.0 MFLOPS.

What the NeXT offers that the others don't is the Motorola 56001 digital signal processor. This chip is designed to perform key tasks very quickly in signal analysis, array processing, music synthesis, and CD-quality sound digitizing (with an external hardware interface via the DSP port). The potential of the DSP lies largely untapped at present, and may never be critical (or even useful) in mainstream applications, but it does give the NeXT a leg up in various niche markets, including the yet-to-materialize multimedia arena. And while a 40MHz SPARC chip can outperform the 56001 DSP chip in many signal processing applications, having a separate DSP minimizes the impact of those applications on overall NeXT system performance.

MEMORY

The memory figures in Table 1 all assume use of 1MB and/or 4MB surface in-line memory modules (SIMMs). Both Apple and NeXT offer parity memory options, which provide a ninth bit for each byte to be used for error checking. The desktop Sun models use parity RAM by default, while the tower models use nonparity RAM.

To improve performance, both the Mac IIfx and the SPARCstation 2 have write-through caches containing (respectively) 32KB and 64KB of high-speed static RAM. When the CPU accesses a memory location (for instructions or data), the address and contents are stored in the cache. Each time the CPU does a memory read, it first checks to see if the desired contents are already in the cache; if so, the CPU reads them from the cache and aborts the regular memory fetch sequence. When the CPU writes out to a memory location, it updates the cache if that location's contents are there as well (hence the term *write-through*).

The Macintosh IIfx and the NeXT both have "on-chip" caches, that is, caches built into their CPUs. The 68030 processor in the Mac IIfx has separate 256-byte caches for both instructions and data; the NeXTcube's 68040 has 4096-byte caches for each. The SPARC processor has no on-chip cache.

MASS STORAGE

Sun, Apple, and NeXT all started out with different forms of removable mass storage, and all have since standardized on a single medium. Sun, going into the classic minicomputer market, went with tape drives. NeXT, seeking to pioneer a new medium, was the first (and so far, only) personal system to have a read/write optical drive as a standard feature. Apple, which likewise made a controversial choice, but a successful one, went with the 3.5-inch floppy disk drive. Both Sun and NeXT have since switched to 3.5-inch floppies, though, in an ironic twist, their disk formats are geared towards MS-DOS compatibility, not Macintosh. Macintosh disk formats are 400KB, 800KB, and 1.4MB; the Apple File Exchange program allows reading and writing of MS-DOS disks. The SPARCstation supports reading and writing of 720KB and 1.44MB MS-DOS formats, as do the NeXT systems; however, the NeXT disk drives also support a 2.88MB format, requiring special disks. But there is also an ease-of-use issue. To read or write an MS-DOS disk on a NeXT, you simply insert it into the floppy drive, and it is automatically mounted and shows up on your File Viewer. For the Mac, you must either first launch Apple File Exchange before inserting the disk, or you must have a third-party software product (such as DOS Mounter from Dayna) that will detect the MS-DOS format and mount the disk accordingly. On the SPARCstation, you have to insert the floppy, open a shell window, and type the command "mount /dev/fd0," which then mounts the floppy drive to the default directory /pcfs ("PC file system").

All three systems support internal hard drives as well. The SPARCstation 2 supports one or two 3.5-inch hard disk drives. The current maximum size listed is 207MB, though that will continue to go up as technology advances. The Macintosh IIfx supports a single 5.25-inch full-height hard disk drive. Apple offers sizes up to 160MB, though third-party vendors offer much larger drives. The NeXTcube has two mass-storage bays. The upper bay holds the floppy drive and one 3.5-inch hard disk drive (sizes include 105MB, 200MB, and 425MB), or one 5.25-inch hard drive (sizes up to 1.2GB). The lower bay can hold one 5.25-inch mass-storage device, either a hard drive (again, up to 1.2GB), an optical disk drive, or a CD-ROM drive. This means, for example, that you could configure a NeXTcube server with 2.4GB of storage. All three systems have SCSI ports, allowing additional external mass storage devices to be added. On the SPARCstation and the NeXT, these ports use the new and improved SCSI standard known as SCSI-2.

VIDEO AND GRAPHICS

Apple and its third-party vendors offer a number of well-integrated graphics solutions for the Macintosh IIfx. If you wanted to, you could stick a different video card into each of the IIfx's six NuBus slots and have all six displays form one giant "virtual desktop." Most cards are designed to support either Apple's 13-inch (640 x 480) RGB monitor, or a third-party 19-inch (1024 x 678) monitor, though other options are available. Color models are either 8 bits (256 colors), using a color look-up table, or 24 bits (16.7 million colors), using direct RGB encoding. Many of the 24-bit cards now also come with built-in graphics acceleration. Other NuBus cards allow for image compression, display of input video on the Mac screen, and blending of external video with Mac-generated graphics.

The NeXT motherboard comes with built-in video, providing 256KB of separate video memory (VRAM) to support its 1120 x 832 x 2-bit monochrome display. NeXT also offers (as an option) the NeXTdimension graphics board, which plugs into one of the other slots and provides an 1120 × 832 x 24-bit color graphics display. The NeXTdimension graphics board uses an Intel i860 RISC processor to provide graphics acceleration, comes with a C-Cube JPEG chip that supports real-time compression and decompression of video signals, and has NTSC and S-video input and output for displaying video input and blending video signals with computer-generated images. A single NeXTcube can support up to four displays: the motherboard's monochrome display and three NeXTdimension boards, all (as on the Mac) forming one large desktop.

Sun offers a wider and more powerful range of video options for the SPARCstation, ranging from a low-cost monochrome option (1152 x 900) to a high-powered (and expensive) 24-bit accelerated color system designed for 3D modeling and animation. All these options use one (or more) of the SPARCstation's three S-Bus slots. Unlike the Macintosh IIfx and the NeXTcube, the SPARCstation does not allow you to drive multiple displays with one system.

THE OPERATING SYSTEM

Both Sun and NeXT use custom variants of a popular operating system: UNIX. Specifically, both SunOS and NeXT system software started out based on the Berkeley Standard Distribution (BSD) release, with both companies adding their own enhancements and modifications. SunOS 4.1.1, the current incarnation, has a number of AT&T System V features, as well as some of Sun's own additions. Sun's eventual goal is to transform SunOS into a version of AT&T's UNIX System V Release 4 (SVR4) with a number of Sun add-ons.

NeXT has based its operating system software on the Mach kernel, developed at Carnegie-Mellon University as an attempt to go back and clean up the bloated UNIX system architecture. The eventual goal is to have a clean and efficient kernel, a clean and efficient (but UNIX-compatible) file structure, and a high degree of BSD 4.3 compatibility.

While Apple is offering A/UX 2.0 (UNIX System V, with BSD 4.3 extensions), that is an option that has a relatively small market share. A/UX's main use is to help Apple land federal contracts that require POSIX compliance (POSIX being a government standard for operating systems). The vast majority of Macintoshes use System (MacOS) 6.0.x, where x = 1 through 7. There are many differences, both major and subtle, between MacOS and UNIX, but a few key ones come to mind: The MacOS has no virtual memory, no DMA, and no preemptive multitasking. System 7.0, due out sometime this year, should add virtual memory, but still leaves out many of UNIX's advantages. However, MacOS also leaves out many of UNIX's inefficiencies and weaknesses, not to mention its generally bloated nature: You can still create a bootable Macintosh system configuration on a single 800KB floppy, whereas a normal UNIX system configuration, complete with swapfile, will cheerfully eat up most of an 80MB hard drive.

Table 2

Comparison of performance

Benchmark (count)		**NeXT ('030)**	**Mac IIfx**	**NeXT ('040)**	**SPARCstation 2**
Sieve	(1000)	39.5	19.9	15.6	7.3
Sort	(2000)	24.5	11.7	9.5	4.9
Matrix	(50)	39.0	25.1	16.4	5.8
Float	(10,000)	9.4	12.2	6.4	3.4
Savage	(20,000)	29.7	12.3	24.7	5.6
Circle	(500)	28.9	7.5	9.3	–
Square	(1000)	28.8	14.9	14.9	–
Dhrystone2		5,451	9,011	22,727	34,884

Compilers

Macintosh IIfx: cc -mc68020 -mc68881 -elems881 -opt full -opt speed (MPW C 3.2)

SPARCstation 2: cc -O4 (Sun C)

NeXT systems: cc -O (Objective C 2.0, from GNU cc version 1.36)

Some simple benchmarks; all times are in seconds, except for the Dhrystone2 benchmarks. For the Dhrystone2 benchmark, the higher the number, the faster the system; for all the others, the lower the number, the faster the system. Note that these benchmarks give only a general indication of CPU performance; they do not (and cannot) measure overall system response, because of the complexities of a multitasking environment. Each benchmark was run four times; the slowest time was thrown out, and the remaining three were averaged together.

Here's a brief explanation of the benchmarks:

Sieve	Sieve of Erastothenes algorithm to find all prime numbers less than 8192. The entire process is repeated *COUNT* number of times.
Sort	Sorts a list of *COUNT* seven-character strings. The list is a numerical sequence in reverse order; uses a selection sort algorithm.
Matrix	Multiplies two 50-by-50 integer matrices *COUNT* times.
Float	Performs each basic floating-point operation (addition, subtraction, multiplication, division) 2**COUNT* times; subtracts the loop overhead time.
Savage	Performs a set of floating-point functions (tan(), arctan(), exp(), ln(), sqrt(), multiplication) *COUNT* times.
Circle	Draws alternating black and white circles with a radius of 200 pixels *COUNT* times (total of 2* *COUNT* circles). Note: the Macintosh IIfx benchmarks were run in 1-bit mode.
Square	Draws alternating black and white squares of size 200 x 200 pixels *COUNT* times (total of 2* *COUNT* squares).
Dhrystone2	A general-purpose integer benchmark developed by Reinhold P. Weicker (in West Germany) and Rick Richardson (in New Jersey), with contributions from others. The value for each platform is based on entering a value of 1,000,000 runs.

Granted, much of that space is devoted to various tools and on-line documentation about how to use them, but that's still all part of UNIX.

USER INTERFACE

The Macintosh proved that the concept of a graphical user interface (GUI) would succeed because of its ease of use. The interface itself is system-oriented, with a single, always-visible menu bar and a minimally changing Apple menu. The desktop metaphor, with folders, document icons, and a trash can, is combined with pull-down menus and cut-and-paste techniques to create an interface even novice users can pick up quickly. In fact, longtime Mac users are alternately amused and disgusted by all the hoopla over Microsoft Windows 3.0, which has managed to approach the point where the Mac user interface was half a decade ago. However, advancement of the Mac's GUI has stalled for the past few years, being improved primarily by third-party utilities. System 7.0 is the first major revision in quite some time and will introduce significant changes (and, we hope, improvements). All said, the Macintosh user interface still remains the most accessible and easiest to learn by computer novices, although in its current form it lacks some of the more modern UI features such as drag-and-drop of objects other than in the Finder, 3D look, and rich interapplication integration. As noted, some of these may be addressed in System 7, due out sometime this year.

Sun has been a bit slow in developing its GUI(s). Starting out with a classic UNIX command-line interface (CLI), Sun then went to SunWindows. This windowing system was a significant improvement on a single-screen CLI, but it came across as having been designed by engineers, not human interface specialists. Although the result had some nifty shortcuts, it was a bit crude compared to the Mac GUI. At one point, Sun was offering two GUIs: SunWindows and the PostScript-based NeWS (Network Windowing System); the latter was one of the first popular client-server window servers and was the first implementation of PostScript for a screen. Sun now also offers OpenLook 2, a GUI promoted by Unix International. OpenLook is designed by Sun in consultation with Xerox experts under license from Xerox. It is relatively clean and simple, focusing more on windows and pop-up menus and less on icons. It is heavily mouse-based: each window carries its own pop-up menus, mouse buttons (right, left, and middle) are significant, and there often are no key equivalents for menu actions. It also has extensive UI policy and support for drag-and-drop operations for tasks such as moving text or images from window to window. However, OpenLook doesn't do that good a job of hiding UNIX from the average user, nor it is as easy to learn and use as either the Mac or NeXT user interfaces.

The NeXT GUI, Workspace Manager, is actually one layer of the entire NextStep environment. Although it does derive some of its look and functionality from other efforts, it is still probably the most original and effective GUI released since the original Mac came out. The interface is application-oriented, with a floating menu visible for the current "front" application, though double-clicking files will automatically launch the requisite application in the background (if present). The File Viewer, with its file shelf and browser mode, eases much of the pain of dealing with a large, hierarchical file structure. Icons are used more heavily than in OpenLook, but they have more discipline in placement than on the Macintosh. In terms of complexity for new users, it falls between the Macintosh and OpenLook. Features that are rapidly migrating into other environments include the drag-and-drop mechanism, use of inspectors, a high level of interapplication integration through the Services architecture, and the effective use of gray, including its trademark beveled 3D look.

BUNDLED SOFTWARE AND UTILITIES

The Macintosh comes with the least bundled software. It provides a few system utilities, such as a disk repair program, Font/DA Mover, and TeachText, and only one application: HyperCard. However, much of the functionality found in separate utilities in other systems—file locator, notepad, alarm clock—are preinstalled in the Macintosh user interface as "desk accessories."

The SPARCstation 2 comes with the usual suite of UNIX tools and utilities; a discussion of them could (and does) fill up an entire book. However, Sun has unbundled some system tools (such as compilers) that have traditionally been part of UNIX. Quite a number of programs and utilities specific to OpenWindows/OpenLook also come with the SPARCstation, including the file manager, a text editor, an icon editor, the print manager, a binder (for binding icons and other info to UNIX executables), a shell tool, a calendar, a clock, a preferences program, a previewer, the e-mail facility, and a number of demonstration programs.

The NeXT has the largest and most impressive suite of bundled utilities, applications, and documentation, not just of these three systems, but of any microcomputer or workstation. As with Sun, this includes most of the standard UNIX BSD 4.3 tools. But it also includes a full-blown development environment, a large assortment of useful and entertaining demonstration programs, a dozen or so genuine NeXTstep applications (such as WriteNow, Digital Librarian, and Digital Webster), and several NeXTstep-based system administration tools (NetManager, UserManager, MailManager, and so on). It also has the best suite of on-line documentation: extensive NeXT system administration documentation, a complete copy of the NeXT technical docs (for developers), system release notes, and special information for NeXT users—all highly formatted and saved as rich text format (RTF) documents. Important note: If you get a NeXTstation with a 105MB or 200MB hard drive, some of these files—such as the development tools and a lot of the on-line documentation—won't be installed, due to lack of disk space. However, you have a full license for all of them, and should you expand your disk storage, you can install the rest of the files from floppy disks.

Not an Artist?

Not a Problem.

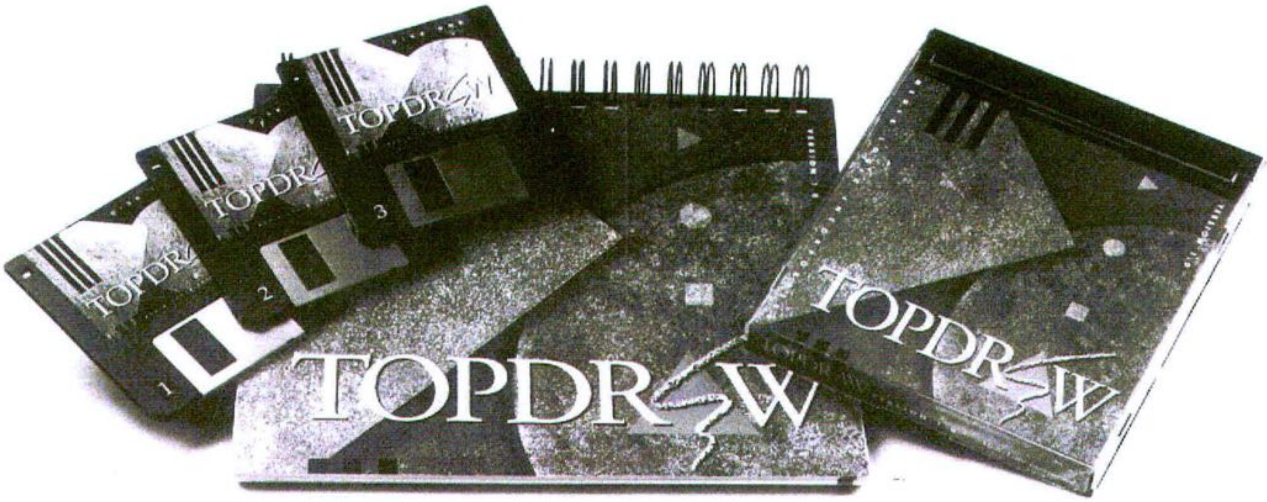


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Table 3

Price comparison

NeXTcube		Macintosh IIfx		SPARCstation 2	
Basic unit	$9995	Basic unit	$10,969	Basic unit	$14,995
425MB hard drive		160MB hard drive		207MB hard drive	
2.88MB floppy drive		1.4MB floppy drive		1.44MB floppy drive	
16MB RAM	400	8MB RAM	200	16MB RAM	
MegaPixel Display		Apple two-page display	2149	19-inch monochrome display	
		Macintosh display card 8·24	799	Monochrome frame buffer	
Keyboard		Apple keyboard	129	Keyboard	
Two-button mouse		One-button mouse		Three-button mouse	
Built-in Ethernet		Mac II EtherTalk NB cable	599	Built-in Ethernet	
Release 2.0 (Extended)		System 7.0 (when released)		SunOS 4.0.1 w/Open Windows	
Total	**$10,395**	**Total**	**$14,845**	**Total**	**$14,995**

Pricing comparison of roughly equivalent systems. RAM upgrades (beyond manufacturer's minimum) is assumed to be at street prices of $50 per megabyte; all other prices are manufacturer's list price. Note that the NeXTcube has double the disk space of the SPARCstation 2 (and almost three times that of the Macintosh IIfx); this accommodates the full set of bundled utilities, applications, and development tools and still leaves more free space than the other two systems. Also, the Macintosh IIfx only requires 8MB to run well, even under System 7.0, while the NeXTcube and SPARCstation both really need the 16MB.

Other items to note:

·Putting A/UX 2.0 on the Macintosh IIfx will cost at least another $995.

·If you are running a Mac-only system, then you could drop the EtherTalk card and cut $599 off the Mac IIfx total.

·You can probably cut the price of the Mac IIfx system by at least $1000 by going with a third-party two-page display.

THIRD-PARTY SOFTWARE

The Macintosh wins hands down here for overall quantity, quality, and value. We're not sure how many Mac applications are on the market, but Apple claims over 10,000, and many of them are (at least) adequately done and decently priced. Moreover, the Mac market boasts first-class products in most application categories, often with several competing products to choose from.

Sun also has an active third-party market, claiming more than 2000 applications available for its SPARCstation line. This, however, includes a large number of non-GUI applications and utilities, and a large number of applications that use the old SunWindows GUI and don't interoperate well with OpenLook 2. Many of these applications are niche-scientific and technical applications that are as a rule quite expensive compared to typical personal computer software. Don't be surprised to find price tags of $1000 to $2500 for many applications that would cost under $700 on a Macintosh. Also, fewer than 100 of these applications actually make full use of the OpenLook environment.

NeXT, having the youngest system and the smallest installed base, has the lowest number of shipping third-party products—somewhere between 100 and 200 by the time you read this. However, the switch to floppy disks, the drop in prices, and the increasing installed base is drawing in a wider range of developers. More importantly, some of the applications shipping for NeXT are unequalled and unavailable on other platforms, such as Improv (from Lotus), TouchType (from Right Brain Software), and Diagram! (from Lighthouse Design).

DEVELOPMENT TOOLS

Although the Macintosh IIfx has no bundled development tools (unless you want to count HyperCard), a wide range of environments and utilities are on the market. Apple continues to improve and promote the Macintosh Programmer's Workshop (MPW), a collection of compilers, debuggers, libraries, and other development-related tools that work together in an environment somewhat reminiscent of UNIX. Having decided that object-oriented programming is a good thing—after several years of ignoring the prodding of development tools product managers—Apple's management is finally giving more support to MPW's object-based products, such as MacApp, Object Pascal, Common Lisp (perhaps the best LISP implementation around), and MPW C++. Third-party tools, such as Think C, Think Pascal, Prograph, ExperLisp, and MacFORTH offer a solution suitable to just about every taste.

Sun, which used to bundle some of its compilers with SunOS, decided that it could cuts costs, reduce support, and (of course) make more money by selling them separately. Each language—C, C++, FORTRAN, Pascal, Modula-2, COBOL, and Common LISP—costs from $2000 to $4400 for media, docs, and a single right-to-use license. There are also lots and lots of third-party development tools for the Sun, including the best computer-aided software engineering (CASE) tools of the three systems, and the best-integrated development environments for large projects (Sabre, for example). All these third-party products, however, are really expensive, running anywhere from $2000 to $30,000.

NeXT also offers an excellent development, but does so for free. NeXT bundles the Objective C compiler, a compatible C++ compiler, a source code debugger, and a number of NeXTstep development and debugging tools. The compilers and debugger are NeXT-extended versions of the Free Software Foundation tools; the compilers are widely recognized as being superior to Sun's and Apple's in terms of code generation. The NeXTstep tools include Interface Builder (an outstanding interface design tool that is oft imitated but yet to be equaled), AppInspector (for run-time browsing of object instances within an application), MallocDebug (to check for "memory leaks"), ProcessMonitor (for run-time inspection of various system attributes and resources of an application), and Bug56 (to debug 56001 routines). Each tool leaves some room for improvement, but collectively they form a powerful system for creating NeXTstep applications. The high level of integration between the tools and the machine OS environment—the coupling between Interface Builder, Objective C, Mach, and the user interface class library (the Application Kit)—is what makes the NeXT environment particularly productive. Third-party development of HyperCard-like products for the NeXT (rumored to be in the works) may help broaden the access of that environment to nonprogrammers as well.

PERFORMANCE AND PRICING

Table 2 gives the results of some simple comparisons between an '030- and an '040-based NeXTcube, a Macintosh IIfx, and a Sun SPARCstation 2. Although these benchmarks don't take into consideration some of the complexities of comparing graphics-oriented multitasking systems, they do give an indication of relative performance. Your actual mileage, of course, may vary.

Table 3 gives configurations and pricing for some roughly equivalent systems from Apple, NeXT, and Sun.

WRAPPING IT UP, TAKING IT HOME

As you can guess, each system has its own strengths and weaknesses. For the Sun SPARCstation, its strengths are its sheer power and speed, its UNIX compatibility, and the large assortment of tools and applications designed for scientific and engineering work. But it's still at its heart a UNIX box, and the user is constantly reminded of (and has to deal with) that.

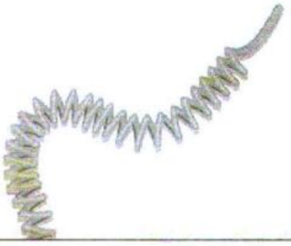
The Macintosh excels as no other computer in ease of learning and use, and in the number and variety of high-quality applications. It is also one of the easiest (if not the easiest) systems to set up, maintain, and administer. But the architecture, both hardware and software, has some inherent limitations, and Apple finds itself putting in more and more effort for ever-diminishing returns on system improvements.

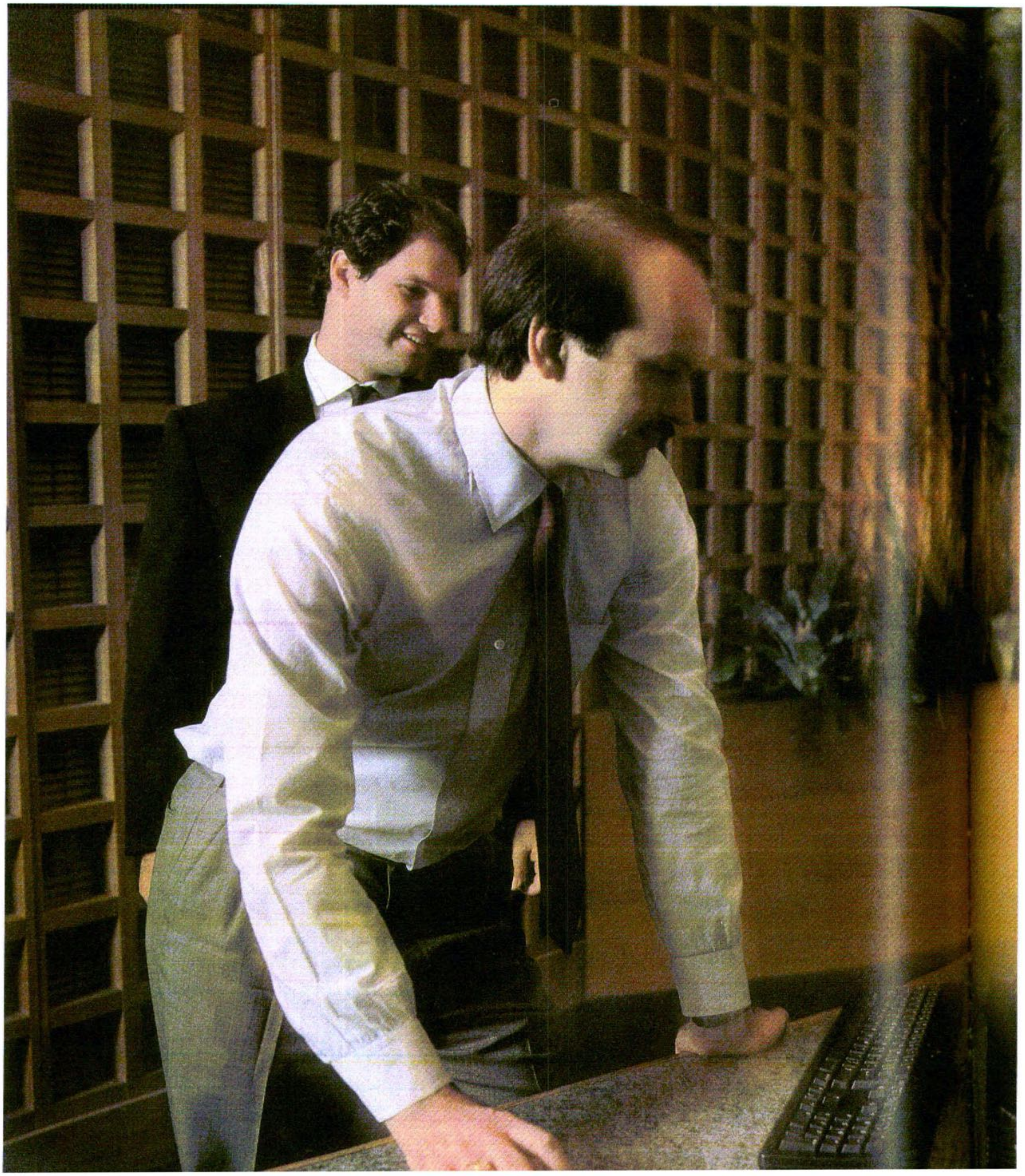
The NeXT has neither the speed of the SPARCstation nor the software assortment of the Macintosh, nor, currently, does it easily merge into existing networks of Macs and PCs, though that scenario is changing rapidly. (See the department NeXTworking in this issue.) However, it bests the SPARCstation in terms of the quality of its user interface, ease of use, and integration of environment. At the same time, its system architecture has fewer obstacles and greater potential for future increases in growth and performance than the Macintosh. And a case can be made that the most interesting, significant, and useful applications being developed are being used on the NeXT system. Lotus Improv is a good example of this; it's the first real breakthrough in spreadsheets to come along in years.

All that considered, we'd have to say that the NeXT is the best deal of the three systems, and not just because this article is appearing in *NeXTWORLD*. The combination of performance, utility, and price is impressive, and unless you have a major roadblock in terms of data compatibility and networking, you'll find the NeXT worth looking at. Most important, if you are starting from ground zero, with few if any other systems already in place, the NeXT could be an ideal choice.

Edward Jung *is the program manager for the Information at Your Fingertips Project at Microsoft Corporation and a principal of the Deep Thought Group L.P., a neural network research and development group.*

Bruce F. Webster *is author of* The NeXT Book *(Addison-Wesley, 1989) and vice president of research and development at Pages, a software company in San Diego, California.*

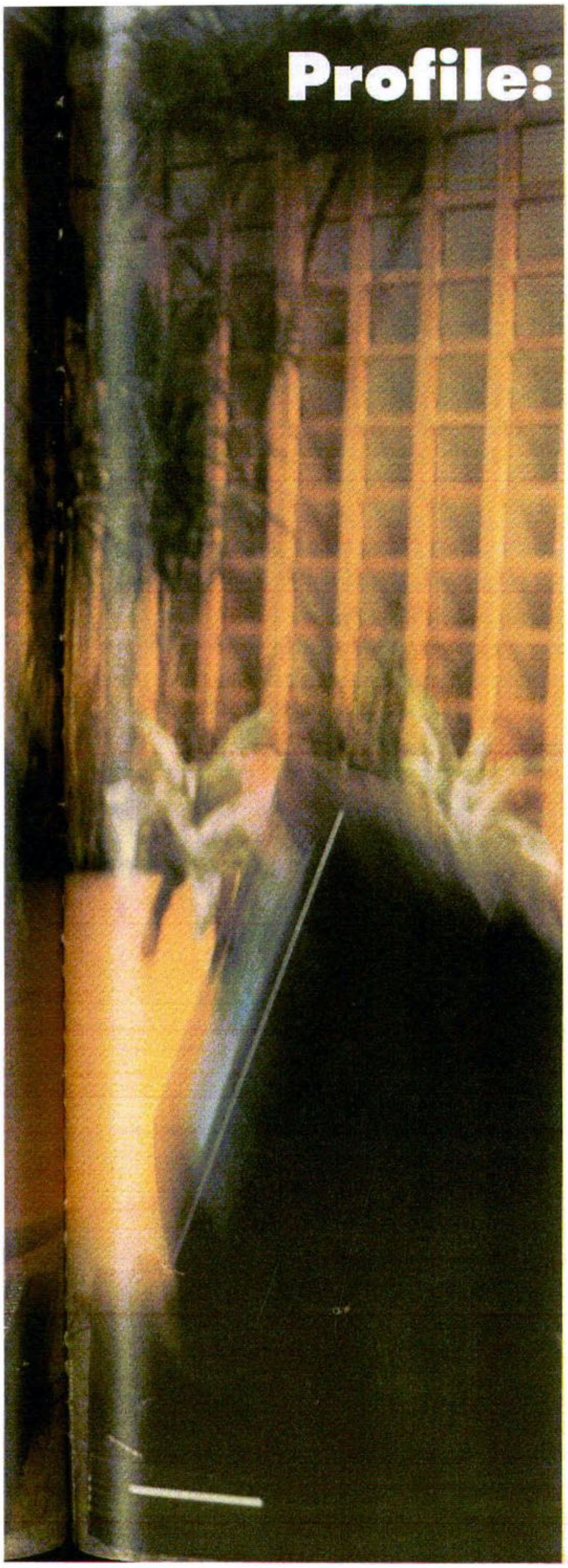




Profile: The Star System

Customized client-contact software and e-mail help Beverly Hills' William Morris Agency keep track of its stars.

by Karen Balch



"The nature of the talent agency business is information," says Chris Godsick, one of more than 100 agents at the Beverly Hills, California, headquarters of the William Morris Agency. "That's what gives one agency the competitive edge over another; it's who has the information and who's able to disseminate it effectively to the agents."

William Morris is the oldest and one of the largest talent brokers in the world. The agency represents some of the biggest names in the entertainment world, including actors, directors, producers, musicians, lecturers, and others. Having information available on demand—such as an actor's availability, credits, booking data, or financial history—can make or break an important deal.

"Situations are always coming up at a moment's notice, and you have to be ready to react," Godsick says. "During pilot season, deals need to be closed whether it's Saturday night at 11 o'clock or Sunday morning. Basically, whatever you need to do for the good of the client, you do."

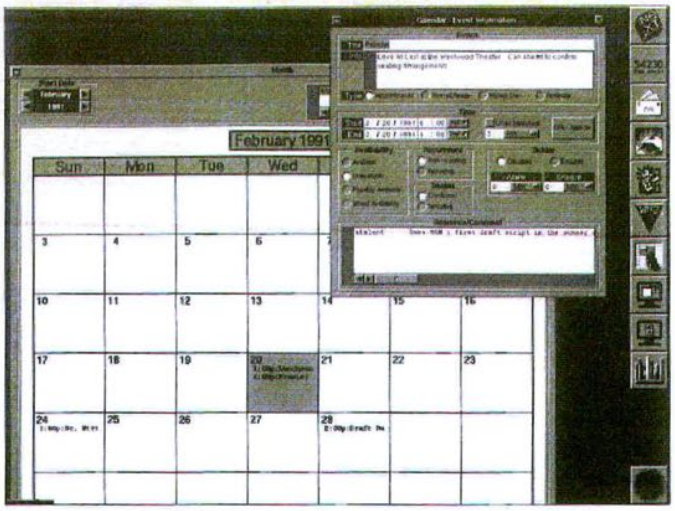
Most of an agent's business is conducted over the telephone: He or she makes and receives between 40 and 200 calls per day. There's no time for telephone tag or missed messages.

"Every time I have to call somebody back because I don't have answers to their questions initially, I'm wasting time," says Godsick. "But if I can answer their questions on the phone, my clients are happy, my buyers are happy, and I'm happy. The relationship is better because clients are being serviced promptly."

Automating communication. A year ago, a walk down the long, narrow hallways at William Morris provided a glimpse of the bustle of talent agents—juggling phone calls, dictating memos to assistants, and dashing from office to office as they closed million-dollar deals. The scene was characterized by loads of paper, lines at the Xerox machines, and reps searching for documents among myriad files in steel filing cabinets.

Things are a little different now. The offices—filled with worn leather chairs and solid wooden desks that characteristically depict the longevity and

Agent Chris Godsick and director of MIS Alex Henry in the William Morris conference room.



The calendar module of William Morris's customized Who's Calling? application includes a month view that can be expanded to show details of a client's schedule.

tradition behind this esteemed 92-year-old company—include something new: NeXT computers.

"Accounting has been automated for years," notes Alex Henry, director of MIS. "The Personal Appearance Department has three Novell networks—one per office—so they've got automation. Beyond that, there were only a few scattered PCs."

About three years ago, the agency started looking for a computer system that would support its varied needs. The main objective was to increase the efficiency with which its agents share information—among departments and across geographic and time zone lines, to the firm's offices in New York, Nashville, London, Rome, Sydney, and Munich. The goal was to reduce the time spent gathering and dispensing information. This would allow agents and their assistants more time to devote to each client, thus enhancing the company's services by improving agent-to-client interaction. Because its communication needs were specialized, the agency also needed a platform that could support quick and cost-effective development of customized software.

To help choose a system, the agency hired the accounting firm of Deloitte & Touche. As the consulting team studied the agency's needs, four criteria emerged: an easy-to-use graphical interface; multitasking capabilities; high-speed, worldwide networking; and stringent levels of data security. After a long assessment, William Morris decided it needed a full-scale executive support system that included every agent and assistant in the company.

"Extending the Novell networks was one option," explains Henry. "Taking the IBM System 38s and putting terminals on them was another. We also talked about Macs." They settled on networked NeXTs. "We ended up with NeXT computers in large part because they're easy to use," Henry continues. "They're easy to learn, fairly easy to program, and they have the interpersonal communications capabilities that we need built into them."

Senior Vice President Mike Simpson, who co-heads the agency's West Coast motion picture department, helped spearhead the push for the NeXT platform. "There was really only one possibility, and that was to go with a graphical user interface," he says.

"Most everyone was computer phobic," Simpson explains. "Many of our agents didn't even know how to type, and they were proud of the fact that they didn't use a computer—that they could carry all the information around in their heads, or that they'd write it on the back of a matchbook." Convincing the established agents that they could actually benefit from the computerization of this traditional office, Simpson says, could have been a difficult task with a less intuitive interface than the NeXT's.

Tailor-made software. The agency initially ordered 250 NeXT machines for its Beverly Hills and New York offices and foresees the possibility of buying more. To date, approximately 200 are installed and connected between the two cities, with the bulk in Beverly Hills. Most of the machines are NeXTcubes using 40MB swap drives. NeXTstations started arriving in January and will make up nearly one-third of the original order. To ensure security, the agency opted not to have optical disk drives (removable media).

BusinessLand (NeXT's distributor) and NeXT introduced William Morris to Adamation, a NeXT developer in Oakland, California, to answer the agency's need for customized client-contact software. Adamation is addressing this need with a special version of its commercially available Who's Calling? client-management program. "Since we could develop software [by customizing packaged versions] much faster on the NeXT than on any other platform," says Adamation's president Stephan Adams, "we were able to bring it to them much more quickly. Two of the reasons for that are the NeXT's Interface Builder and the applications that NeXT offers."

Who's Calling? includes a database for client information; programs for monitoring and tracking telephone calls and meetings; a calendar system for scheduling of multiple events; a tickler function that implements voice response in order to automatically remind users of scheduled events; a report generator for reports, form letters, mailing labels, and other information-sharing functions; and a message center for communicating text or voice messages.

The customized version includes a Rolodex-type directory; a phone memo sheet on which agents can quickly record calls in a client's database record; a library module for keeping track of videocassettes, scripts, and other materials on loan; and a complex calendaring module.

The directory feature lists common numbers used by every agent, while other fields are reserved for private numbers. "For example," Simpson explains, "the president of Warner Brothers will be in everybody's directory, but my dentist is only going to be in mine."

The phone sheet provides a form for quickly entering notes from phone calls into a client's record. "When somebody calls, you type in the first three or four letters of their last name, hit return, and the computer will look in the database and pop in their full name and phone number," Simpson says. "At some point, it will also be able to recognize the call coming in and pull up the data automatically." Agents can quickly dial a client's number by clicking on the phone number in the form.

The calendar module is divided into three sections—individual, group, and world—to allow scheduling of individuals or groups of various sizes. "Let's say you want to set up a meeting with five different agents here in the department," Simpson suggests. "The old way was that my secretary would have to call each of them. Just as she'd get four of them lined up, the fifth couldn't do it and she'd have to call them all back again. This way, you can call up their calendars, and—because they're graphically rendered—you can lay them one on top of the other and it shows you what the open time is."

Agents also use the scheduling feature to track the availability of clients. "Often you've got an actor—say, Tom Hanks—who's doing a movie in March, and then he's doing another one in August, and then he may be available in January. We have those time periods blacked out where he's definitely not available, it's gray where he might be available, and it's clear where he's definitely available."

When an agent makes a booking, he or she will record it in another module of the software, entering data such as the client's name, the buyer's name, the type of contract, the terms of compensation, and the shooting schedule. The compensation information will automatically be posted to the client's financial history so that agents can later run queries and sorts if desired. After a film that an agent has booked is actually shot, the program posts the information about the deal to a report that lists each client's produced credits.

"If I'm on the phone with a business affairs executive at Warner Brothers trying to get $2 million for a client, for example, and the exec's saying that they've never paid a director with two credits going into his third movie $2 million, I can pull up a list of all our director deals at Warner Brothers with three or less credits for $2 million or more and be able to say, 'Wait a minute. Two years ago, you gave so and so two and a quarter, so don't tell me that.'"

Internal affairs. The specialized software modules are currently being tested and should be fully implemented by April. In the meantime, agents are taking advantage of standard Who's Calling? features and the NeXT system's networking, multitasking, and e-mail capabilities, which allow them to quickly access and share timely data. That they can exchange critical information instantly—long before staff meetings occur—has caused a marked shift to a more strategic use of valuable time.

"It's totally changed the way we do business," says Simpson. "The e-mail alone has done that. In the past, when you'd get information, if it was really important, you'd call somebody and play telephone tag for a while until you finally got through to them. Otherwise, information that was important but not crucial would eventually be disseminated, but maybe up to a week later—and then it may have been too old to use. Now, everything that happens goes out instantly on e-mail."

The e-mail system that NeXT provides with its computers includes not only text but voice and picture features as well (see the review in this issue). "Today, some people here use voice [in e-mail]," Henry says. "There's limited use of still picture. We're not using moving picture at this point, but we've seen prototypes."

Simpson is excited by the changes the NeXT has already wrought in William Morris's service. "The e-mail, as critical as it is right now, is only the tip of the iceberg," Simpson promises. "I think you can sense from all this that we're definitely among the converted."

Karen Balch *is a free-lance writer living in Orange County, California.*

You're witnessing quite an important moment in the history of the Motorola 68040 microprocessor.

It's actually shipping. In volume.

And while advances in chip technology have become an almost annual event in the industry, you may rest assured that

MOTOROLA DELIVERS THE REVOLUTIONARY 68040.

there's never been anything like the 040 in a desktop computer before.

With its "single chip implementation," the 040 is as much an economic breakthrough as it is a technological one. Because many of the sophisticated functions that used to require expensive additional equipment are now built in.

For example, the 040 chip incorporates the capabilities of a "floating-point" coprocessor. So it can not only handle high-level mathematical routines, but do so up to ten times faster than its powerful predecessor, the 030—the processor at the heart of many of today's fastest machines.

Cache memory has also been built in, to further speed the chip's operations.

While we're on the subject of speed, we're pleased to report that the 040 chip delivers a full 15 MIPS. In overall performance, that's 300% better than the 030. (And, for comparison, literally twice the performance of a Compaq Deskpro 486®.)

Of course, the 040 chip was designed to be perfectly compatible with all those computers that have been built around other chips in the 68000 family. So it will support the enormous base of 68000 software that currently runs on Macintosh® and UNIX® platforms.

The 040 is the result of an extraordinary effort by Motorola engineers. But if you think the chip is something, wait till you see what happens when you build a computer around it.

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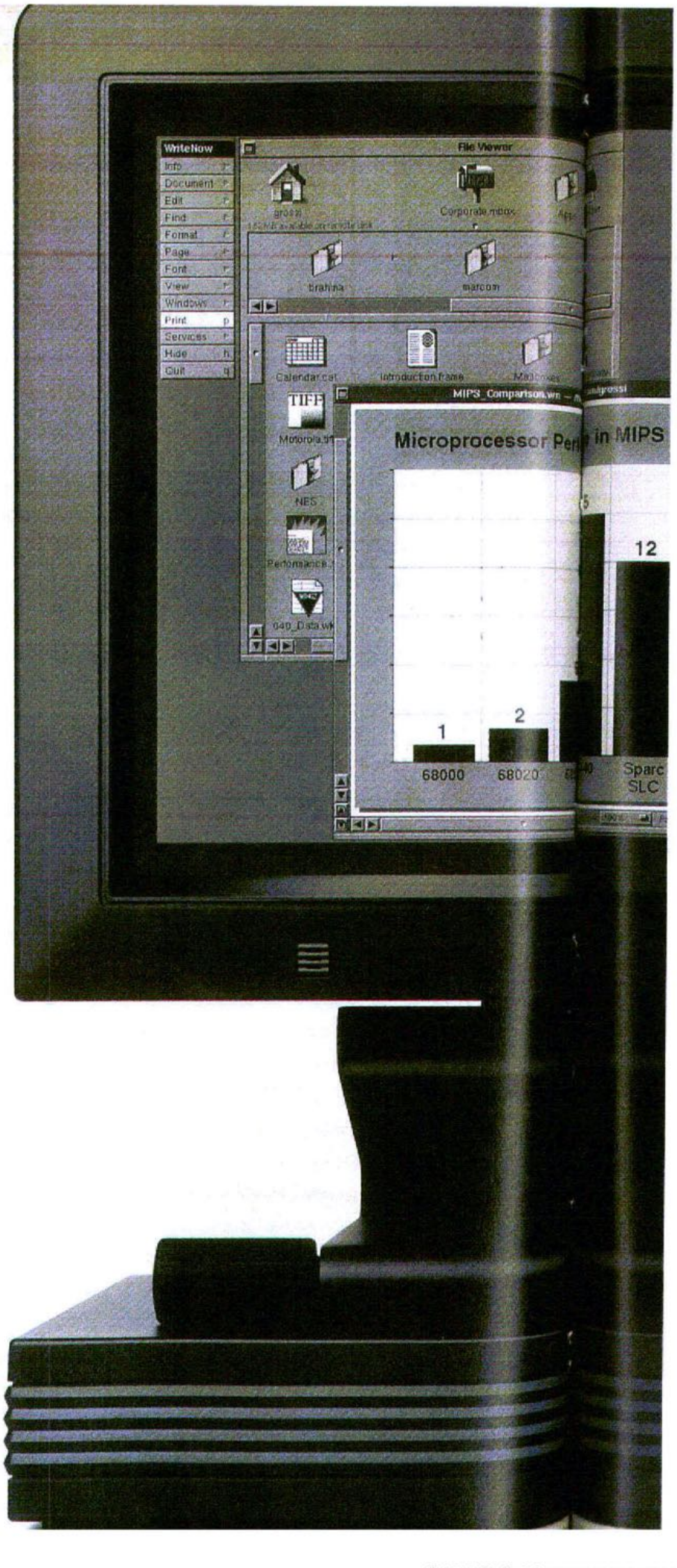
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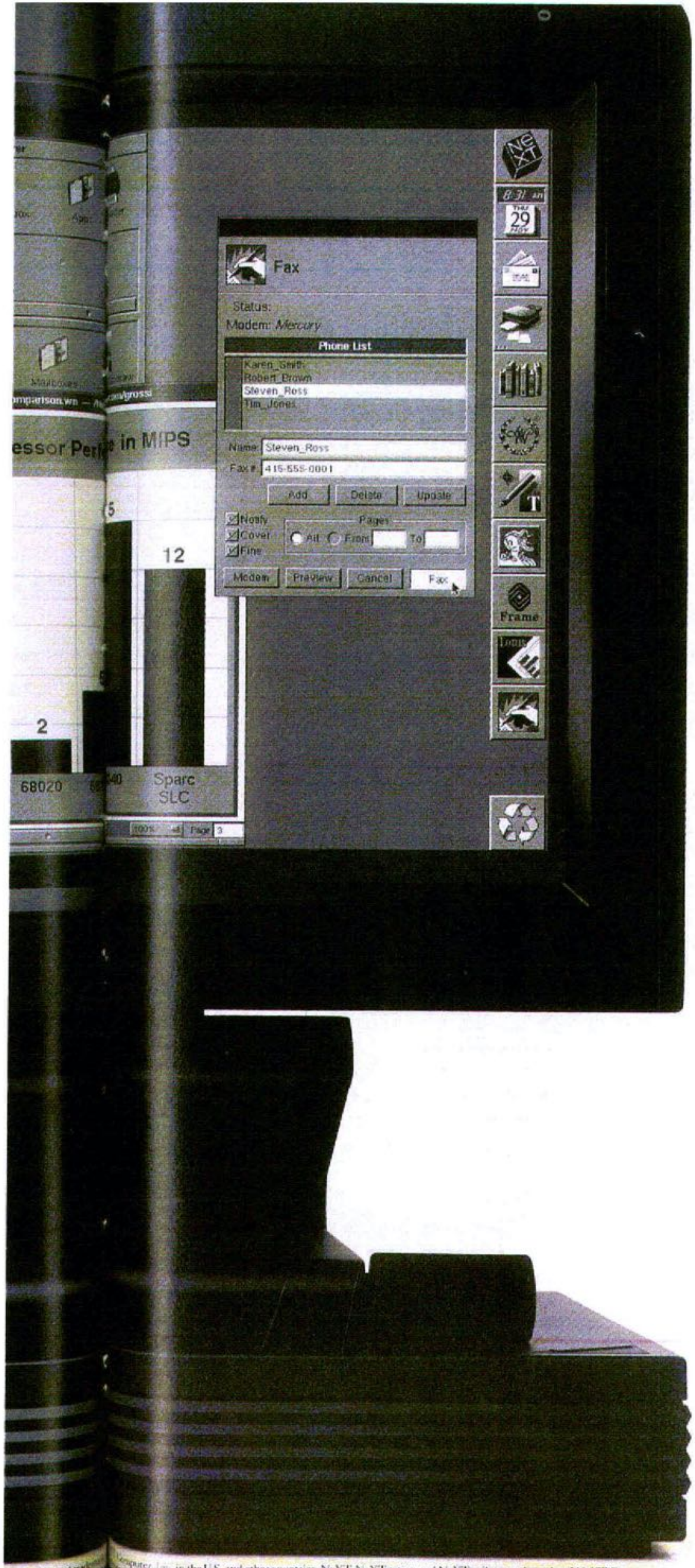

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Modem: *Mercury*

Phone List
Karen_Smith
Robert_Brown
Steven_Ross
Tim_Jones

Name: Steven_Ross
Fax #: 415-555-0001

By no coincidence, this is also a milestone in the history of NeXT™ computers. As promised, the NeXTstation™ computer is now officially shipping. In volume.

It's the first computer designed to take advantage of Motorola's most recent feat of engineering: the 68040 processor.

NeXT DELIVERS THE FIRST COMPUTER THAT HAS IT.

The NeXTstation offers the networking and multitasking power of UNIX, but without the complexity most workstations are known for. The graphical NeXTstep® environment makes it as easy to use as any desktop PC. Even Macintosh.

But the applications you can run on the NeXTstation are beyond anything you've seen on a desktop computer before.

Lotus® has recently unveiled Improv,™ a revolutionary spreadsheet that lets you view your data in infinitely different ways. WordPerfect® is offering the first "What-You-See-Is-What-You-Get" version of its best-selling word processing software. And Adobe® will soon be releasing the NeXT version of Illustrator,™ which fully exploits NeXT's pure PostScript® environment.

And with true multitasking, all of your applications can run at once. Including NeXTmail™—provided with every NeXT machine—which helps keep you in contact with everyone in your working world, using text, graphics and voice.

The NeXTstation computer comes complete with the 17" MegaPixel Display, 8 megabytes of memory, a 2.88MB floppy drive, a 105MB hard disk and both thin- and twisted-pair Ethernet. All for $4,995. Reason enough for *Byte Magazine* to say the NeXTstation "may now be the workstation price/performance leader."

If you'd like a brochure describing the NeXTstation computer in detail, just call 1-800-848-NeXT. We deliver.

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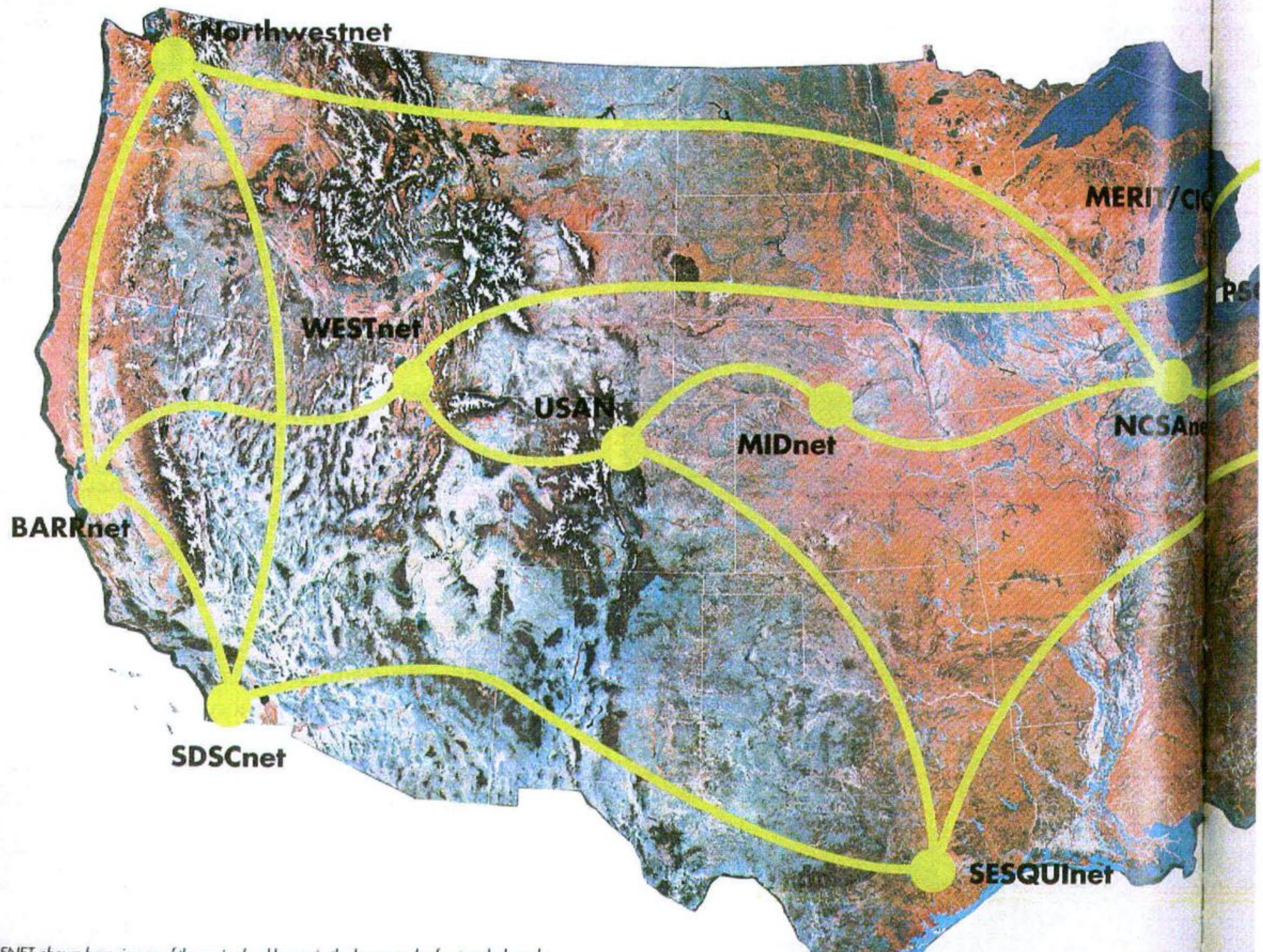
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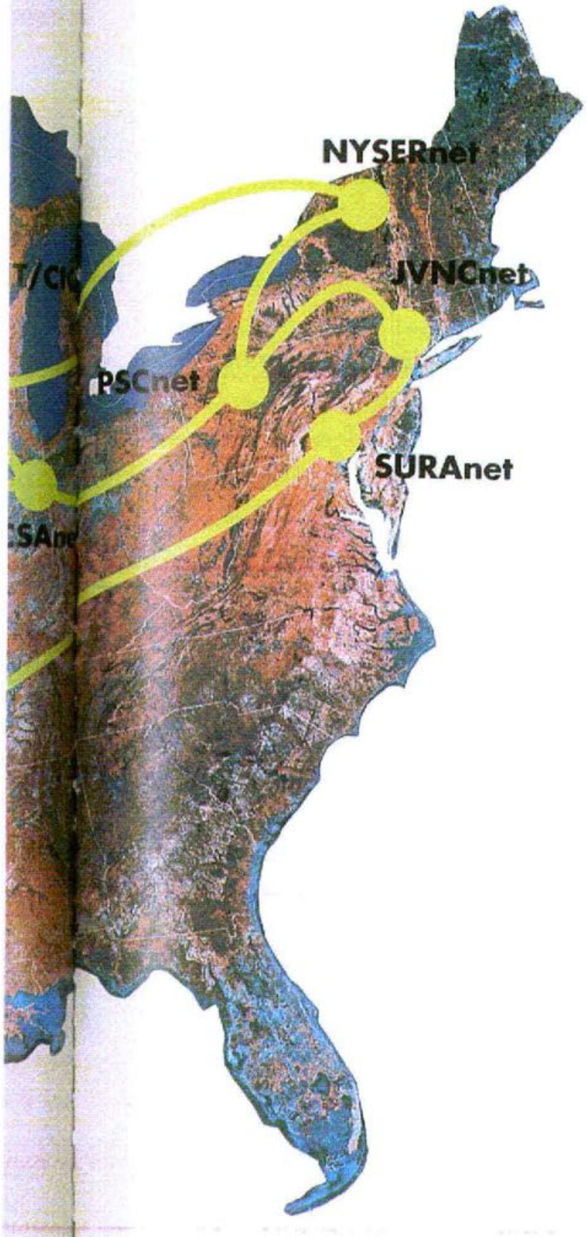
NSFNET, shown here, is one of the major backbones in the larger web of networks loosely called the Internet. Backbone networks are linked to regional networks throughout the nation, which in turn feed into campus local-area networks from which individuals launch their long-distance messages.

Source: *The User's Directory of Computer Networks*, edited by Tracy L. LaQuey (Digital Press, 1990). Maps used here were supplied by Charlie Catlett, National Center for Supercomputing Applications (NCSA), University of Illinois, Ubana-Champaign, June 1989.

Quick and to the Point



The Internet links UNIX desktops for high-speed transmissions to any part of the globe.

by Paul Baer

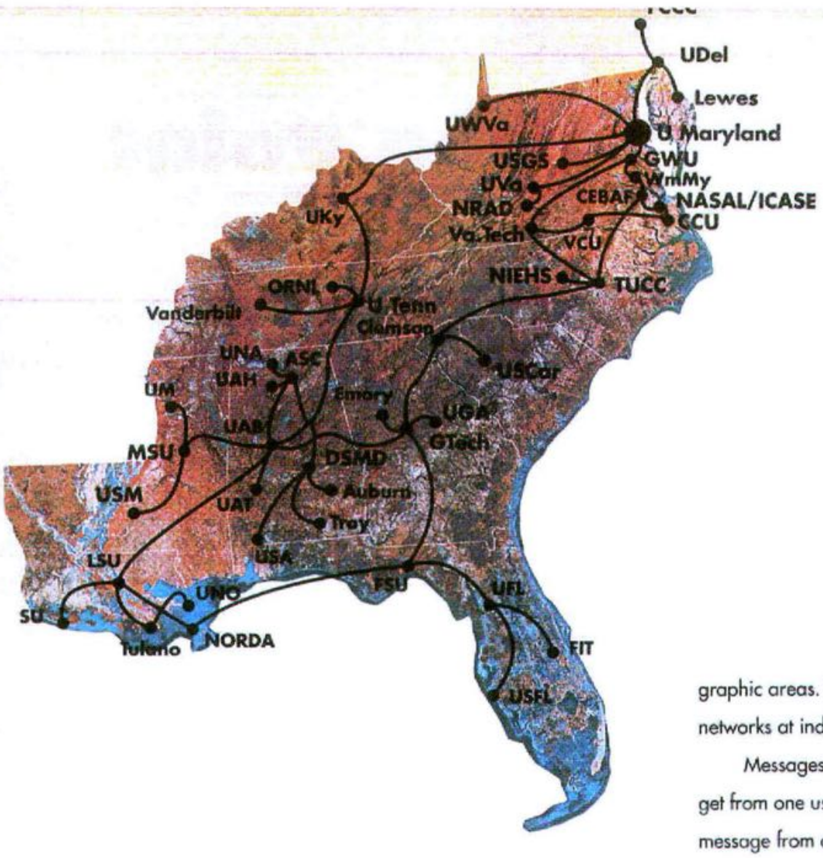
Scientists announce discoveries, such as the recent advances in high-temperature superconductors, and they are discussed around the world within a matter of hours. A chemist performing AIDS research views images of molecules on her computer screen in San Francisco that she generated remotely on a supercomputer in San Diego. Programmers working on a development project quickly and easily move entire programs back and forth across the country to share them with collaborators.

These are but a few uses of the Internet, the international high-speed computer network that connects scholars and researchers across the globe. As more computers are connected every day, this network is rapidly becoming as indispensable a method of communication as the telephone and is changing the ways in which all types of research are conducted.

"A researcher with a new idea can post it on the Internet and immediately get feedback from the best scholars in the discipline, no matter where they are located around the world," says Geoff Goodfellow, president of Anterior Technology, a network-services provider in Menlo Park, California, and a member of the Internet community since 1973. "We are no longer subject to the delays of publishing in journals or the expenses of traveling to conferences."

The backbone's connected to the... The Internet is hard to define precisely. Generally, it can be explained as the various interconnected computer networks in the U.S. and abroad that support TCP/IP (Transmission Control Protocol/Internet Protocol) for computer communications. Because TCP/IP provides a communication standard, any computer on a LAN (local-area network) that is connected to the Internet can interact with any similarly connected machine elsewhere on the network in what is effectively real time.

The Internet has a hierarchical structure. At the highest level are several national or international wide-area networks, often called "backbones." One such backbone in the U.S. is NSFNET (the National Science Foundation Network), which connects universities, private and government laboratories, and commercial research organizations. The backbones connect to smaller mid-level or regional networks, which are usually, but not always, based on geo-



The Southeastern Universities Research Association Network (SURAnet) connects universities in the Southeastern United States. SURAnet began operation with ten universities and two "stub" sites in 1987. It now has 64 sites on line. SURAnet is linked to the NSFNET backbone at the University of Maryland.

graphic areas. The regional networks, in turn, connect the various "campus" networks at individual sites; these are usually complex LANs.

Messages must pass up and down through this hierarchy of networks to get from one user to another. Consider, for instance, the path of an e-mail message from a geology professor at the University of Chicago to a researcher at an oil exploration company in Dallas. The message would first pass from the university network, up through a regional network in the Midwest, and on to a backbone. Then it would come back down through a regional network in Texas to the corporate LAN at the exploration firm.

Deep roots. The Internet evolved from early computer networks developed in the late '60s and early '70s, particularly the ARPANET, operated by the Defense Department's Defense Advanced Research Projects Agency. TCP/IP was developed for use on the ARPANET, which was originally an experimental network created for research into packet-switching. As the capabilities of the ARPANET developed, and as other networks, such as CSNET (a nonmilitary network for computer science), were created and connected to existing networks, scholars and researchers became increasingly dependent on this electronic community for the basic conduct and communication of their work.

In the mid-'80s, a federally funded National Supercomputing Initiative channeled resources into establishing a national computer network and a group of regional supercomputing centers around the country. This effort eventually grew into what is now the NSFNET. At the same time, other countries were developing their own research networks. Gradually, all of these networks were linked together, forming a sort of web of networks reaching into Eastern and Western Europe, Australia, and Japan. In 1989 the ARPANET was phased out.

Today, nearly every major university in the U.S., many foreign schools, most of the scientific branches of the U.S. government, and an ever-increasing number of commercial organizations engaged in research and development (particularly of computer hardware and software) are connected to the Internet. As the benefits of the Internet are becoming more widely recognized and the technology more standardized and less expensive, smaller schools (even some high schools), laboratories, and other organizations are joining. The total number of organizations currently exceeds 2000 and is growing rapidly.

What sets it apart. The Internet is most commonly used to transfer e-mail and large files. But unlike other networks, which provide e-mail and file transfer on a "store and forward" basis, the Internet also provides users with the ability to log on to computers at distant sites, enabling access to remote computers.

At the University of California at San Francisco, for instance, researchers use the Internet to access supercomputers in San Diego for biochemical research into AIDS and other diseases. "We need to use supercomputers because the computation required for modeling complex biomolecules, which may involve tens or hundreds of thousands of atoms, exceeds the capacity of most workstations," explains Thomas Ferrin, a professor in the Pharmaceutical Chemistry Department at UCSF. Ferrin also notes that the Internet facilitates communication with commercial research companies, such as DuPont, which may be located thousands of miles away from the research site.

Remote access to NSF supercomputers is awarded through a grant process similar to the one used for regular NSF grants, available to recipients of National Science Foundation grants in lieu of a portion of their funds. Other users can make individual arrangements with—and payments to—owners of private supercomputers for access to their machines. "Without the Internet," Ferrin says, "the cost of [buying] supercomputers would put them beyond the reach of most institutions."

Another factor that distinguishes the Internet from other networks is the high speed and capacity at which it moves data. Most of the backbone circuits operate at a speed of 1.5Mbps (bits per second), and several 45Mbps links were scheduled to be installed in late 1990 and early 1991. Just three or four years ago, the fastest links on the Internet were typically 56Kbps. This increase in speed and capacity makes it a practical way to move very large files—be they computer programs, graphic images, or simply long text documents—that previously would have been sent on tapes, disks, or paper, if they were sent at all.

To gain a little perspective on these numbers, it is helpful to make a few comparisons. Typical office LANs, for instance, operate at speeds from 230Kbps (for LocalTalk) to 10Mbps (for Ethernet). A page of text may be 25,000 to 30,000 bits in size; a single graphic image may be 10 million bits or more; a large computer program may easily be 100 million bits. When it ran at just 56Kbps, the Internet was slower than the slowest office LAN and could move perhaps two pages of text in a second; a graphic image could take several minutes. At 45Mbps, the Internet is faster than most office LANs and can move 1500 pages of text in a second and a large graphic image in a fraction of a second.

Because the Internet can move huge files so quickly, numerous archives of documents and programs can be usefully maintained on it. These archives, which are located and administered at different sites around the Internet worldwide, include technical papers on the Internet itself, public-domain software for a wide variety of computers, and ongoing discussions on diverse subjects. (See The NeXT World, in each issue of *NeXTWORLD*, for information on the comp.sys.next newsgroup on the Internet.) Internet users do not need accounts or passwords on the host machines to access the archives. This arrangement is inviting to users and limits the administrative burden.

Who's running the show? The control and administration of the Internet reflects the decentralized way in which it has evolved. At the highest level, the Federal Research Internet Coordinating Committee (FRICC) brings together representatives of various federal agencies involved in the Internet. The Internet Activities Board is responsible for overall design and planning. The board ensures coherent technological development by working through groups like the Internet Engineering Task Force and the Internet Research Task Force.

Backbones have their own administrative bodies and technical workgroups that are responsible for developing infrastructures. The mid-level and regional networks coordinate their activities through a body known as FARNET, the Federation of American Research Networks.

Much of the administration of the Internet is handled by the Network Information Center, operated for the federal government by SRI International (a private, nonprofit research organization in Menlo Park, California) and usually referred to as the NIC. In earlier days, the NIC registered every computer and user on the Internet. Now it coordinates the registration of new networks (currently more than 3000 are registered), maintains directories of hosts and users, and houses the primary archives for documents related to the development of the Internet.

To link up to the Internet, universities and other institutions must join a mid-level or regional network such as BARRNet (the Bay Area Regional Research Network) in Northern California, or SURAnet (the Southeastern Universities Research Association Network). Representatives of the participating institutions collectively administer the circuits and equipment, determine fees and membership requirements, and plan the evolution of the network. Individuals typically cannot join the Internet; they must belong to an organization that is connected.

Further Readings

For more information about the Internet, check out these titles at your local bookstore or library.

Books

Comer, Douglas E. *Internetworking with TCP/IP: Principles, Protocols and Architecture.* Englewood Cliffs, N.J.: Prentice Hall, 1988.

Frey, Donnalyn, and Adams, Rick. *!%@:: A Directory of Electronic Mail Addressing and Networks.* Sebastopol, Calif.: O'Reilly & Associates, May 1990.

LaQuey, Tracy Lynn. *Users' Directory of Computer Networks.* Austin: Office of Telecommunication Services, University of Texas System and Digital Press, 1990.

O'Reilly, Tim, and Todino, Grace. *Managing UUCP and Usenet.* Sebastopol, Calif.: O'Reilly & Associates, December 1989.

Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide.* Bedford, Mass.: Digital Press, 1990.

Todino, Grace, and Dougherty, Dale. *Using UUCP and Usenet.* Sebastopol, Calif.: O'Reilly & Associates, July 1990.

Periodicals

NSF Network News. Published quarterly by the NSF Network Service Center (NNSC), located at BBN Systems and Technologies, 10 Moulton St., Cambridge, Mass. 01238.

The Link Letter. Published monthly by the Merit Computer Network/NSFNet, 1075 Beal Ave., Ann Arbor, Mich. 48109–2112.

Additional Sources

Krol, Ed. "The Hitchhikers Guide to the Internet." RFC118, Menlo Park, Calif.: Network Working Group, SRI Network Information Center, September 1989.

Socolofsky, T., and Kale, C. "A TCP/IP Tutorial." RFC1180, Menlo Park, Calif.: Network Working Group, SRI Network Information Center, January 1990.

A more extensive bibliography is available from the SRI Network Information Center at 333 Ravenswood Ave., Menlo Park, Calif. 94025. Ask for RFC1175, "Where to Start—A Bibliography of Internetworking Information."

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...with Who's Calling?, the most advanced client data management system available today. For the first time, you can rein in all your complex client information easily. Who's Calling? is designed to work as easily over a network as on a single computer, and it's available exclusively on NeXT.

Who's Calling? consists of four interacting modules. There's a Calendar for project management of one or many people, with features such as "voice-annotated ticklers" to keep schedules on track; a Client Database with customizable fields and a media well for attaching voice, text, and images to client records; a Conversation Manager that logs the history of all phone conversations and automatically posts call-back dates and times to the Calendar with voice-annotated ticklers; and a Message Board, a multimedia supplement to NeXT Mail for broadcasting live

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Call us.
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As a method of communication, the Internet parallels the American telephone system, both in the way it is structured and in the way it is used. However, there is one major difference between the two in terms of administration: There are no direct usage charges associated with the Internet, no equivalents of long-distance tolls.

Institutions pay membership fees to support the regional and mid-level networks and must also pay for their own site networks. The backbones are typically paid for by the government (the NSFNET alone currently costs about $15 million annually, with additional funding from the Department of Defense, the Department of Energy, NASA, and several state governments). There is no charge to the user, though, to send an e-mail message or transfer a file. This is a result of several factors, among them the sheer administrative difficulty of charging individuals by usage, and the desire of both government and individual institutions to encourage people to use this new and relatively unfamiliar technology.

Down the pike. A powerful motivation that fuels further development of the Internet is an understanding in the U.S. that we need to boost scientific education and research if we hope to remain competitive in the global marketplace.

One discussion currently taking place in the networking community and the federal government concerns developing a National Research and Education Network (or NREN). The name refers to not only the proposed physical network but also the organizational structure that would administer it and the legislation that would fund it. Although the legislation authorizing funding for further research and development of NREN stalled in the last Congress, plans are still in the works to establish this national network that would attain a capacity of 3Gbps (3000Mbps) or more by the end of the century. That capacity is more than 60 times greater than the fastest existing U.S. backbone and powerful enough to transfer the contents of the *Encyclopedia Britannica* in one second, making possible applications such as real-time videoconferencing, distributed computing, and others not yet imagined.

Because the field of computer networking is evolving so rapidly, it is impossible to say precisely how the Internet will develop technologically and administratively. But the notion of the Internet, one network transparent to all users, will remain with us in the same way that a single telephone system has come to be taken for granted. It is probably safe to say that the changes the Internet will make in our lives will eventually be as profound as those of the telephone.

Paul Baer *is assistant director of BARRNet, the Bay Area Regional Research Network at Stanford University.*

Note: You can keep up with the current happenings and discussions on and about the Internet in The NeXT World column in this and every issue of *NeXTWORLD.*

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Adamation's strong products, such as Who's Calling?, are only part of our total solution approach to today's office automation challenges. All modules of Who's Calling? include customizable reporting capabilities. And beyond our shrink-wrapped solutions, Adamation can help solve your unique information management needs, tailoring existing products or creating new ones from scratch.

Call us. We're forging ahead on the NeXT frontier, and we'd like to take you along.

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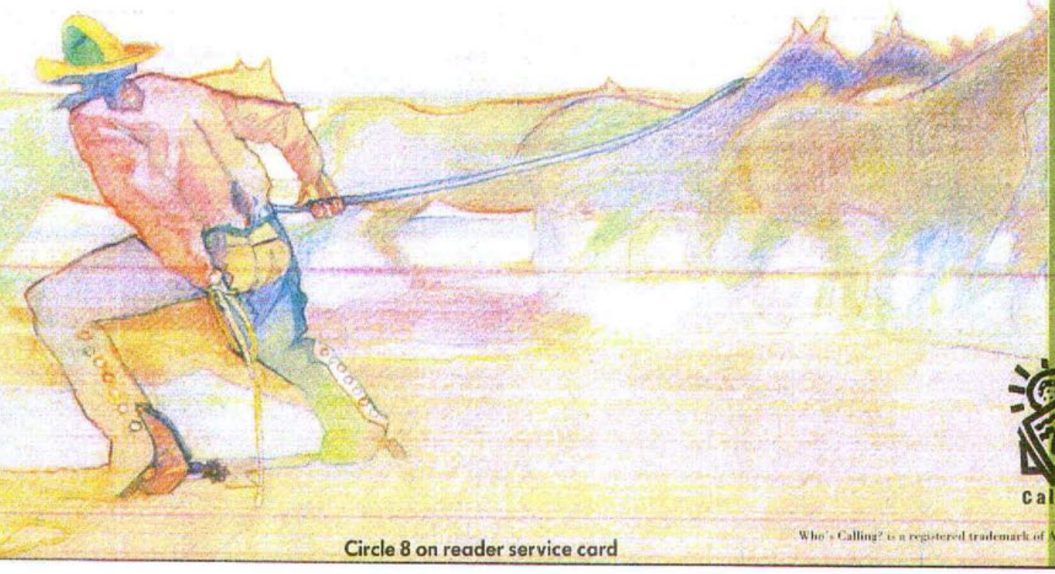
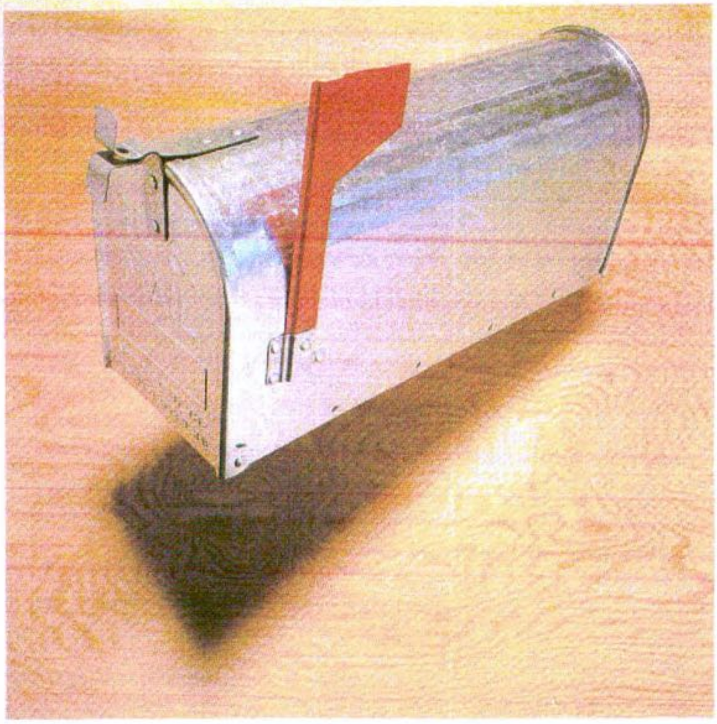




Pushing the Envelope

NeXT's bundled e-mail application provides the tools for effortless multimedia communication.

by Robert D. Nielsen

Photography/Dave Mag

Steve Jobs calls e-mail the "substrate" of interpersonal computing (IPC), not its definition. That said, though, there is no denying that NeXTmail, the e-mail software provided with every copy of NeXTstep, provides a model for NeXT's vision of IPC. An application specifically designed to help members of a networked workgroup work effectively together, NeXTmail takes advantage of the platform's key technologies: UNIX, the digital signal processor, and interapplication communication are all bound into important NeXTmail features. The result is a stunning example of how rich communication through a computer can be.

Personal computer e-mail software has come a long way since the days when only the bravest PC users would tackle the command-line interface, dip switches, and protocol setups necessary to run the personal modem. The friendly iconic interface of Apple Computer's AppleLink software, combined with its ability to attach binary (formatted) files, provided the first communication software for the rest of us, thereby freeing e-mail from its connotations of telegraphic text streams in cyberspace. Macintosh e-mail systems for AppleTalk networks have carried on the tradition.

The connection of workstations for workgroup computing and the Internet have made e-mail links to colleagues an intrinsic part of network communication systems. But UNIX systems have historically placed little emphasis on ease of use. NeXTmail brings the ease of use commonly associated with Macintosh communications programs to UNIX. With NeXTmail, NeXT has made a strong statement about the kinds of communication they think coworkers need, and what interpersonal computing consists of.

Mixed media. Implementing the capability to send formatted documents with e-mail messages was an important step in elevating e-mail from a medium for telegraphic messages to a mode of transferring work for collaboration. Taking advantage of the digital sound processor (DSP) built into every NeXT computer, NeXTmail upped the ante with sound. With NeXTmail, users can enclose in their memos spoken messages, music, or any other aural information. Enclosed TIFF and EPS graphics images are automatically displayed. This means that NeXTdimension owners could theoretically send video productions back and forth with the same method, though the large files may severely tax the bandwidth. All types of documents can be enclosed in a single message, creating a mini multimedia presentation for the recipient. Co-workers

CONNECTIVITY

NeXTmail 2.0

● ● ● ●

The NeXTmail system, bundled with every NeXT machine, takes advantage of the machines' DSP to add a new layer—voice annotation—to current e-mail standards. Although some features are less than intuitive, the system works effectively to make multimedia communication almost effortless.

Free with NeXTstep 2.0

NeXT Computer, 900 Chesapeake Drive, Redwood City, CA 94063. 800/848-NEXT across the nation can collaborate on a proposal, complete with formats and necessary illustrations. Voice annotation might call the recipient's attention to an important point in the document and explain points not included in the text. (At NeXT Computer's offices, the system is configured to automatically add a scanned-in photo of the sender for an additional interpersonal touch.) The goal is to allow the sender to express himself or herself effortlessly and eloquently, by any useful means.

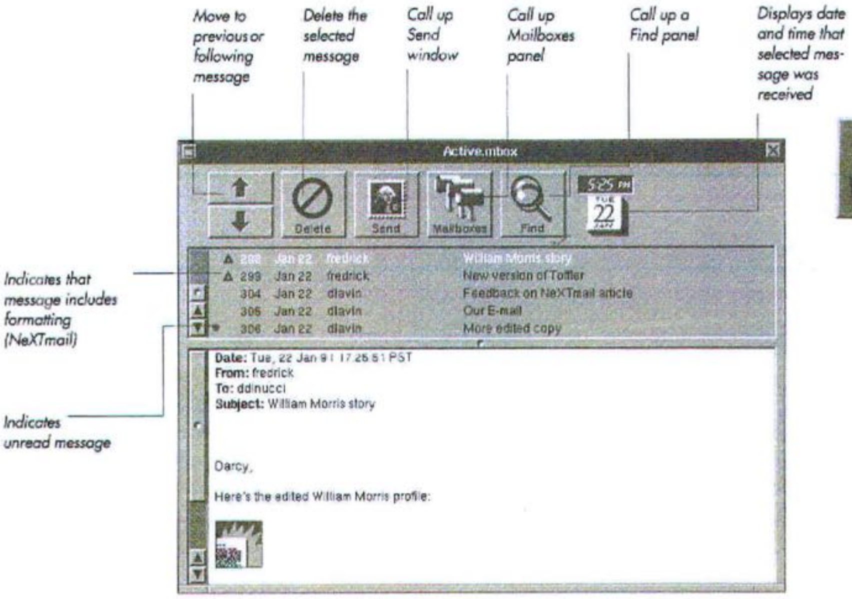
Unfortunately, this vision can take place only in the world of NeXT machines. Formatted information can only be exchanged between machines that run the same or compatible software, and non-NeXT computers cannot read documents or graphics created with NeXT-specific software, let alone decode Lip Service messages. Messages can still be sent to those less fortunate users of other platforms, but the text must be constrained to the standards of the recipient's machine. (A button in the Send window strips NeXT-specific information from messages so they can go to linked users on other computers.) But even when you discount NeXTmail's multimedia capabilities, it still represents progress. It embodies the philosophy of the NeXTstep user interface, characterized by point-and-drag and intuitive interaction with files and other on-screen objects.

Because NeXTmail is based on UNIX, it can also give access (with the proper subscription, a modem, and a phone line) to the Internet or the UNIX-to-UNIX Copy (UUCP) network. (For more on these services, see the article "Quick and to the Point" and The NeXT World in this issue.) These networks hook you up with a world of UNIX users and information. Connections to just about any NeXTmail service, anywhere, including MCI, CompuServe, and others, are available through the Internet.

Any way you say it. NeXTmail's main window is the "active mailbox," one of any number of mailboxes you can create. The active mailbox serves as a holding cell for any new NeXTmail received. Messages are listed at the top, along with each message's subject and the name of the person who sent it. Selecting a message displays its contents in the text window. Buttons at the top of the mailbox allow you to move to other functions and files.

To send a message, you click the Send button in the mailbox, bringing up a separate Send window. To:, Subject:, and cc: fields identify the mes-

Photograph/Dave Magnusson


Move to previous or following message
Delete the selected message
Call up Send window
Call up Mailboxes panel
Call up a Find panel
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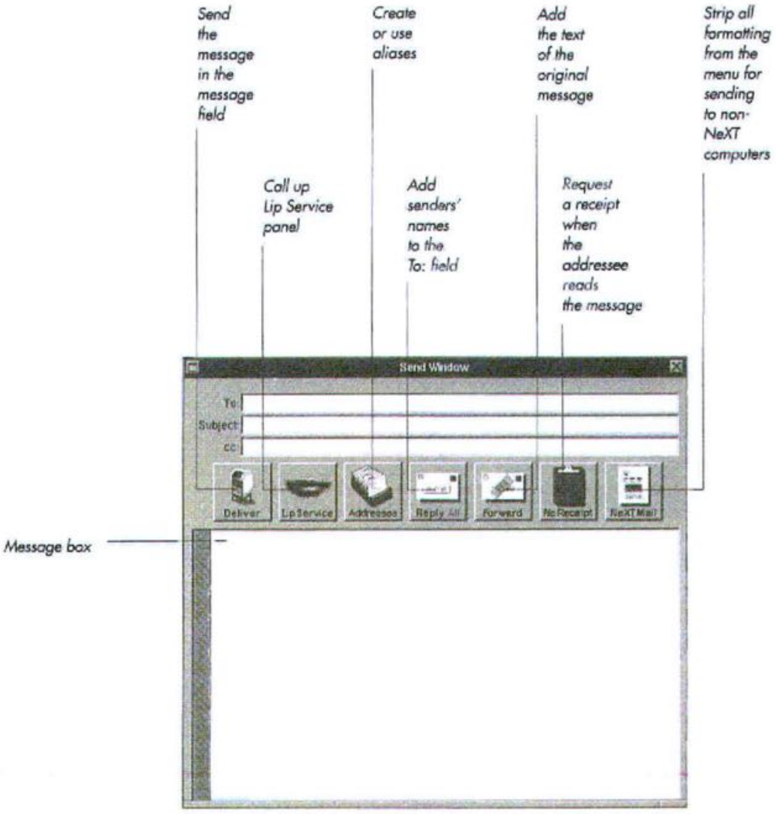
306 Jan 22 dlavin More edited copy

Date: Tue, 22 Jan 91 17:25:51 PST
From: fredrick
To: ddinucci
Subject: William Morris story

Darcy,

Here's the edited William Morris profile:

The active mailbox is NeXTmail's main window. Here, you can view and store messages you've received or move to the Send window.


Send the message in the message field
Create or use aliases
Add the text of the original message
Strip all formatting from the menu for sending to non-NeXT computers
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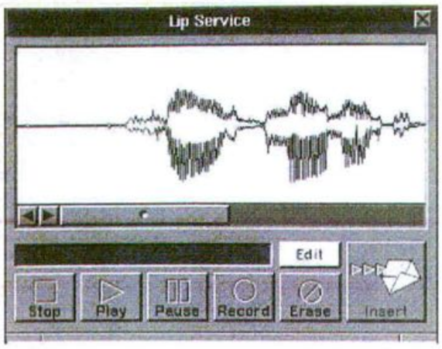
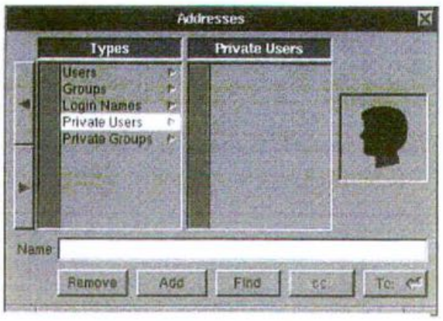
The message box in NeXTmail's Send window can include information of any kind: formatted text, displayed graphics, Lip Service recordings, or documents. Clicking Deliver sends the message on its way. Other buttons choose options of varying degrees of usefulness (see the other illustrations for more on some of them).



NeXTmail's Lip Service panel uses the familiar metaphor of a tape recorder. The long gray field acts as a sound level display. Clicking Edit calls up a panel (shown here) in which the message is displayed as a waveform, which you can select, erase, and copy sections of to alter the recorded sound.



You can create or remove aliases (group addresses or shorter user names) with the Addresses panel, available from the Send window or from the Tools menu. To add an alias to the To: field in the Send box, you choose the name, then click To:.

sage. A text box below provides a place to construct it, and a new set of buttons supply addressing and delivery options, plus access to Lip Service.

NeXTmail incorporates the text-editing features of the new Application Kit's Text object, including a spelling checker and a find utility. As in any standard NeXT application, Command-b adds or subtracts boldface in selected text and Command-i supplies italics. NeXTmail uses NeXTstep's standard Font panel and Page Layout panel. The Font menu provides the standard options for bold, italic, superscript, subscript, and larger and smaller size, plus unusual options for graying text and copying fonts. You can insert a very simple ruler with Command-r, allowing you to set tabs and margins. Unfortunately, the only tab option available is for left-aligned tabs; there are no options for decimal or centered tabs.

Attaching files from other applications in a message entails simply dragging the file's icon from NeXTstep's File Viewer into the mailbox window. The file is then represented in the message by its icon (annoyingly minus the document's name), which can be moved and deleted just like any text character. TIFF and EPS files are an exception to this rule. As mentioned earlier, they are immediately displayed on screen—great for adding your personal signature (previously scanned in one of these formats) to documents that you send. The message's recipient can simply double-click the icon of the attached document in the mailbox window, and the document's application will be immediately launched (if present) and the document will be displayed.

The inclusion of graphics or documents is an important feature of NeXTmail, but their different treatment creates some user interface confusion: TIFF and EPS files are expanded and shown directly in the window (whether you want them to be or not), but all others (even RTF files, which one might very reasonably want to have expanded into the mailbox window) are displayed by icon and are attached. The user should be able to configure or override these behaviors.

Lip service. One noteworthy medium in NeXTmail is Lip Service, the voice annotation feature. This voice recorder/editor/player has a perfectly intuitive interface, using the cassette recorder we all know well as its metaphor. Record, Stop, and Play buttons work just as you would expect. You speak into the microphone (optional equipment on the first NeXT computers, but built into the new monochrome MegaPixel Display and into the Sound Box that comes with NeXT's MegaPixel Color Display). Clicking Edit brings up a window with an editable waveform. Max Headroom's trademark vocal style is no longer a mystery to anyone who has spent a few minutes playing with Lip Service. We had a lot of fun copying a section of a voice and pasting it several time-time-times.

The completed recording is represented by a pair of lips in the NeXTmail window. When the recipient double-clicks the lips, a Play panel appears. Clicking Play begins the playback.

Sending and receiving. After you've added an addressee's name and a subject notation, clicking the Deliver button in NeXTmail's Send window dispatches the completed message. Other buttons let you request a list of addresses or notification when the recipient has read your message. The button that strips NeXT-specific information from the document for sending to non-NeXT computers is also located here.

Clicking Addresses calls up a panel that lets you choose or create aliases for people you communicate with frequently. (The panel is also available through NeXTmail's Tools menu.) Creating aliases lets you use short, memorable names for people whose e-mail addresses are complex and hard to remember. For example, Eric Scott's e-mail address is eps@toaster.sfsu.edu. I've created an alias for him, Eric_Scott. Even better, aliases can refer to groups: I may have an alias called "Red_Team," which refers to everyone in my work group. To insert an alias in the To: field of the Send window, you select it in this panel and click To:.

The Addresses panel is one of the rougher implementations in the application. Aliases are maintained internally in five categories: Users, Groups, NeXTmail Names, Private Users, and Private Groups. The operating system's slip is showing here. Because NeXTmail has been implemented on top of UNIX, you need a system administrator to set up and maintain the aliases—a serious problem for enterprisewide networks. Also, NeXTmail should be able to directly access the NetInfo database for users and aliases.

Another odd decision of NeXT's was to hide the Blind cc: and blind Reply To: fields in a panel that is available only through the Tools command in the NeXTmail menu—and then to call the command Options. These fields should be part of the main mail window.

An optional archiving feature (activated by clicking Archive in the Preferences panel) causes NeXTmail to keep copies of any message that you send—a useful way to document and track your daily work flow. The only other way to archive outgoing messages electronically is to add your own user name to the cc: field or group alias for every message you send.

Disposing of NeXTmail. Once you've read an incoming message, you may choose to delete it, forward it on, or archive it. (I prefer to archive any message with content, even if the content is only the return address.) NeXTmail provides options for each. Sadly, these features are not very well thought out.

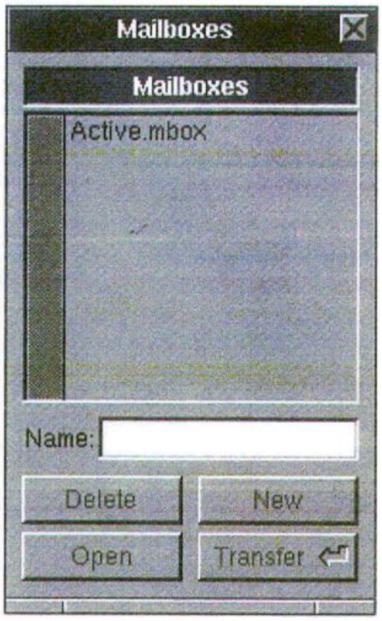
To reply to a message in your active mailbox window, you first click Send (in the mailbox window), and then the Reply button in the Send window. The action simply fills in the To: and Subject: fields with the address of the sender of the original message and the subject of the first message, preceded by "Re:" For some reason, though, the text of the first message—necessary for reference—is omitted. A far more useful interface would be to have the Reply button in the mailbox window, automatically calling up the Send window with completed fields. Clicking Forward in the Send window copies in the original text.

To save messages, you first have to make a special mailbox for yourself, using the mailboxes panel (available in the active mailbox window or from the Tools menu). You can create any number of mailboxes, with any name you choose, and each mailbox can store an unlimited number of messages. The idea of using another mailbox as a storage place, unfortunately, is hardly intuitive. Even aside from the confusion inherent in the nomenclature, the idea has its problems. If NeXTmail allowed me to save my messages in the directory of my choice, then I could take better advantage of my archived messages by using Digital Librarian to build indexes for me. As it stands, each mailbox is stored by as one huge file. To find a message, you open the mailbox where each message is listed in the order it was archived. The interface is identical to the active mailbox, with the same buttons and options. You can sort the messages in any mailbox using commands in the Utilities menu.

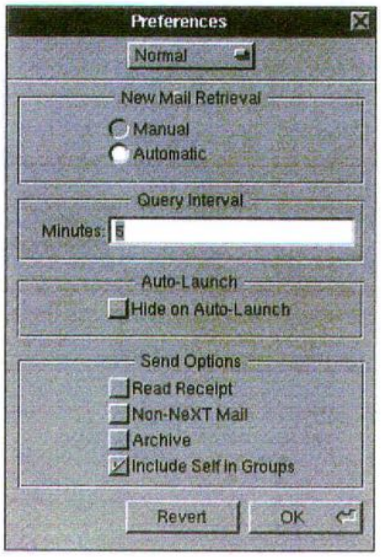
The presence of a Compact utility points out another flaw in the system. Deleting a message with the Delete button in the mailbox does not actually delete it; the system saves it so that you can "undelete" it later. The messages are not truly gone until you use the Compact utility. This presents not only a security problem, but a space problem as well. Users' mailboxes could soon hold many megabytes of messages.

So close. It's a pity that these interface flaws mar the shine of the NeXT's showpiece application. These glitches, however, can't hide the fact that, as a system, it does its job admirably—and adds whole new media to our concept of workgroup communication. Its presence in a connected UNIX workgroup system (networked NeXTs) is an undeniable encouragement to workgroup communication. On the NeXT's multitasking system, users can have NeXTmail always launched, so that a message can be on its way in a matter of seconds. Cutting text or graphics out of one document and pasting it into a mailbox window adds perhaps five seconds to the process. Voice annotation may add ten (depending on the length of the message, of course). It all adds up to a level of effortless communication not seen before and serves as a model for the future of interpersonal computing. ◼

Robert D. Nielsen *is an independent software consultant and registered NeXT developer.*



The Mailboxes panel, available from any mailbox or from the Tools menu, is where you create, delete, and open mailboxes or transfer messages to secondary mailboxes for storage—a rather odd concept.



Normal

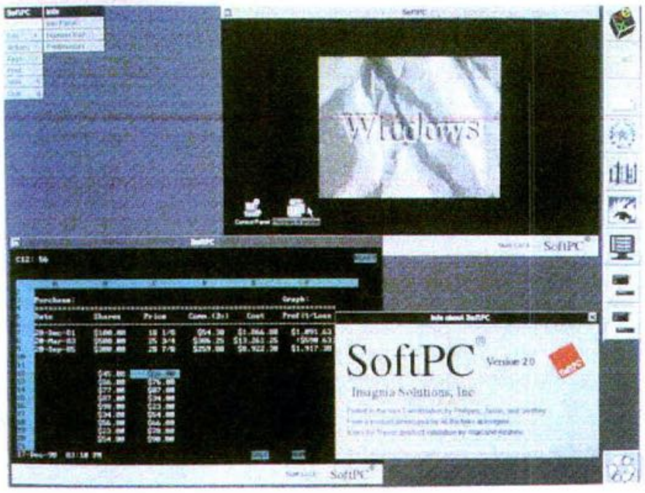
New Mail Retrieval
○ Manual
● Automatic

Query Interval
Minutes: 5

Auto-Launch
☐ Hide on Auto-Launch

Send Options
☐ Read Receipt
☐ Non-NeXT Mail
☐ Archive
☑ Include Self in Groups

NeXTmail's Preferences panel allows you to request send options, such as read receipts and text-only formatting (non-NeXT NeXTmail) for every message. You can also request to archive every message you send and to include your own address in every group alias you create. You can also control how and how often NeXTmail queries the server for new messages. An expert level of Preferences controls settings, such as where NeXTmail looks for and stores messages.



DOS on the Dock

by Robert D. Nielsen

PC users get understandably enthusiastic when they first see a NeXT machine. The benefits of multitasking, interpersonal computing, and NeXTstep are immediately apparent. Two obstacles, though, obstruct their path from a PC to a NeXT. First of all, something as momentous as a platform change requires transition time. Second, certain specialized DOS programs may never be ported to the NeXT. And even though those programs may represent only a small part of someone's work, that small part may be critical.

SoftPC solves these problems by enabling NeXT computers to run DOS programs. This undertaking is so important and so difficult, and SoftPC succeeds so well at it, that SoftPC ranks as one of the most important programs for the NeXT.

We ran several popular PC programs under SoftPC—including Lotus 1-2-3 Release 3.1, dBASE IV, Wordperfect 5.1, and Microsoft Windows 3.0—without any trouble. In fact, we have used SoftPC in several different settings, and we have never seen any problems at all. There is little to say—it simply works. And even though we do not rate the speed of beta products, we can say that, even in beta, SoftPC delivers the promised performance of a fast AT or slow '386—blazingly fast for an emulator.

Software hardware. Amazingly enough, SoftPC accomplishes its task entirely in software. The two 1.44MB disks (one program, one documentation) contain all you need to make your machine DOS-capable. It will work on any machine running NeXTstep 2.0. A 68040 processor is recommended, but this is not a problem because the vast majority of machines will already have one.

SoftPC emulates an IBM PC/AT with an Intel 80286 processor and an 80287 math coprocessor. Your program's 80286 instructions are executed by an extremely fast interpreter (the heart of SoftPC), which converts them to code that will run on the NeXT computer's native Motorola 68030 or 68040 processor. From the NeXT's point of view, SoftPC is just another program. But once it is running, SoftPC creates an artificial environment for your MS-DOS applications that makes them think that they are actually running on an IBM PC.

SoftPC supports graphics up to full EGA (you can set a preference for either CGA or EGA monitor emulation). In either mode, you can set SoftPC to emulate either 4 or 16 gray levels on a monochrome NeXT monitor. Color NeXT monitors should display color PC programs in color, but because we didn't have access to a NeXTstation Color or NeXTdimension, we couldn't test the color display.

The graphics emulation means that Windows 3.0 runs just fine under SoftPC. (A nice touch: Your NeXT mouse emulates a Microsoft mouse when it is in the SoftPC window.) The program also emulates expanded memory (conforming to the 4.0 LIM specification), allowing your DOS programs up to 32MB of RAM.

SoftPC gives your PC programs full access to the keyboard, mouse, printer, and even serial devices, such as modems. You can also configure SoftPC so that your NeXT computer's SCSI devices (such as a CD-ROM drive or scanner) are available, though this configuration requires a user to be exceptionally knowledgeable about the NeXT computer. Favorite DOS activities such as printing the screen are also supported.

File sharing. In at least one important way, SoftPC improves on the native capabilities of the IBM PC architecture: SoftPC has its own file-sharing architecture (FSA). This is exceptionally useful because the directory structure of FSA disks is shared with your UNIX file system; that is, each FSA disk is made into a UNIX directory, and each file on the disk is also visible as a UNIX file. This means that you can move files from the IBM PC world into the NeXT world by simply copying them from IBM PC floppies or non-FSA virtual hard disks into an FSA disk—after that, the files are visible under UNIX. Similarly, you can move UNIX files into an FSA directory, and they will appear the next time you execute DOS's DIR command.

FSA makes the process of converting your IBM PC files to the UNIX world so easy that you can rely on making the conversion regularly. Imagine that you still run your company's database system using dBase under SoftPC, but you have switched over the publishing of your weekly company newsletter to FrameMaker running in the NeXT environment and you need to transfer a report from the database program into your page-layout program every week. With SoftPC, you can configure your DOS database program to save the report in text form into an FSA directory, and then import it into the NeXT application each week before you print the newsletter.

FSA also breaks DOS's normal 32MB hard disk limit. Even without using FSA, however, you may have as many 32MB hard disks on your simulated PC as you like; you are limited only by the hard disk space of your NeXT computer. Each PC hard disk simply looks like a very large file from the NeXT's point of view. In fact, you can even make backups of entire PC hard disks by simply copying the hard disk file into a different directory or to a different hard drive or optical drive on the NeXT.

Disk, disk. It's a pity that SoftPC can't use 2.88MB floppy disks, the standard floppy disk size of the NeXT computer system. This limitation arises mainly out of the PC's file architecture. The program also falls short in the way it deals with external floppy disk drives. If you have an external floppy drive (probably connected to the SCSI bus), formatting disks under SoftPC is impossible. Luckily, the NeXT's BuildDOS program can format disks on these drives, but who wants to leave the program for such tasks? Also, external disk drives cannot be used for PC programs that use master-disk copy protection schemes. Many older PC applications, such as earlier versions of Lotus 1-2-3, made heavy use of such schemes, so this limitation could prove troublesome to some users.

Ergonomically, SoftPC could use some improvement. Its display, which is light gray on black, can be difficult to read. The light-gray color is a bit too dark to make a pleasing contrast with the black background. Insignia should have included a user preference that allows users to invert the PC screen for a better effect.

Emulation of the PC keyboard's extended keys (such as function keys 1 through 12) are supported through the use of a NeXT menu; to hit the PC's F2 key, you select F2 from SoftPC's Keys menu. Although this arrangement works well enough, it is a shame that there is no graphical representation of the PC keyboard and keypad.

SoftPC supports two communication ports (COM1 and COM2) and two printer ports (LPT1 and LPT2). This arrangement is consistent with the needs of most DOS programs, but experienced PC users will note that the real IBM PC/AT can have four communication ports, whereas SoftPC can have only two.

Despite such minor flaws, SoftPC is a great program. It aimed high and made the mark. Not only will its sales help Insignia, but its presence helps the NeXT platform overcome a major hurdle: migration from DOS. We gave SoftPC four cubes, the highest possible for a beta, but it's a good candidate for five when we update this review. ■

Robert D. Nielsen *is an independent software consultant and registered NeXT developer.*

SoftPC

◆ ◆ ◆ ◆ (beta)

A remarkably reliable, fast, and ingenious emulator that enables NeXT machines to run DOS PC software.

$499

Insignia Solutions, 254 San Geronimo Way, Sunnyvale, CA 94086. 408/522-7600

Marlow, NH: Your NeXT home away from home.

Dear Friend,

In 1982, David Hall and I started a business called PC Connection here in Marlow, NH (pop. 564). We sold peripherals and software exclusively for the IBM PC and backed every sale with toll-free technical support.

In early 1984, we founded MacConnection. It was the first mail-order company for the Mac and has set many new standards in computer mail-order, including money-back guarantees and $3 overnight shipping *(you can actually get same-day delivery* between midnight and 3:15 a.m.).

By 1987, we were #2 on *Inc.* magazine's list of 500 fastest-growing privately-held companies. And today, our company has grown from just two employees (David and myself) to about 300—all in this small New Hampshire town. In fact, that's our corporate headquarters in Marlow's historic "Christmas Trees Inn" shown below.

Now we're bringing our eight years of mail-order expertise to NeXT computers. Like our other divisions, NeXTConnection has its own sales and support staff and every product is backed by toll-free technical support. Your order will ship overnight for just $3. And it will arrive in a tight-fitting box, cushioned with clean and recyclable newsprint. You'll find our very first collection of software and peripherals for NeXT computers on the following pages.

Now that we've shown you where we're coming from, we'd love to show you just how convenient, risk-free, and inexpensive buying by mail order can be. Our phone lines are open all day and all night from 8 a.m. EST Monday straight through 5:30 p.m. EST Saturday. Whether you want answers or products (or both) feel free to call anytime: 1-800/800-NEXT.

Sincerely,

Pat Gallup

Patricia Gallup, President & CEO

ANNOTATION of ENHANCED MAGNETIC RESONANCE IMAGES
(CLICK ON LIPS FOR PRESENTATION...)
Cerebral Cortex
Cerebellum
Spinal Stem
Corpus Callosum
Pituitary Gland
MAGNETIC RESONANCE IMAGING
Anterior gyrus
Precentral sulcus
Pineal gland
Angular gyrus
Hypothalamus
Pons
Pyramis
Folium
Pituitary gland
Optic chiasm
Writing the Contract
Text
Text

DIAGRAM! ALL YOUR DATA AND DRAWINGS.

LIGHTHOUSE DESIGN

A graphics tool for people who think and draw ...at the same time. Here's a drawing program intelligent enough to *really* put your ideas across. **Diagram!** is a true digital whiteboard on which you can create compelling combinations of diagrams, drawings, and data. And its innovative file-linking feature lets you include data from other NeXT applications. That's right, you can drop a spreadsheet file, for example, right into your drawing. Setting links is easy, too. Just drag a file icon over a drawing object and drop it in.

Diagram! includes a full array of drawing tools and lets you do formerly tedious jobs (like decision trees or PERT diagrams) with only a couple of keystrokes. Store frequently used drawing objects in symbol palettes and customize any object quickly. Once you connect objects (like labels or captions), they stay connected no matter how you move them around. Diagram! also allows you to add voice annotation so your drawings can talk to your audience. And they can even respond with their own comments and feedback. This is definitely the next step in drawing technology. Also available on optical disk.

Want to get your hands on a lot of great NeXT shareware? The **Big Green Disk** gives you more then 400 megabytes of software, utilities, games, and other useful files on a single optical disk, including bundled GNU programs, MIT's X windowing system and hundreds of UNIX programs. And for each Big Green Disk sold, Lighthouse Design will contribute $5 to environmental charities.

Lighthouse Design ... 60 day MBG

8621	Diagram!	$349.
8660	Diagram! *(optical disk only)*	call
8663	Big Green Disk *(optical disk only)*	249.

ABATON

Tip the gray-scale in your favor. Abaton's **Scan 300/GS** is a 300dpi 8-bit scanner that can deliver 256 shades of gray for quality reproduction of even continuous-tone photos. Five different scanning modes (for line art, halftone, and gray-scale images) give you the clarity you need. The included software lets you precisely control brightness and contrast. You can even preview images before scanning. And the large flatbed design (with a removable lid) lets you easily scan oversized documents.

Get your communications together. What's the next horizon in communications? The **InterFax** which gives you NeXT fax *and* modem capabilities in one unit. Send and receive faxes at 9600bps to just about anyone, anywhere with ease. The built-in 2400bps modem is loaded with features, including automatic data-to-voice switching, built-in diagnostics, and much more. And with MNP-5 data compression, you can send files at an effective rate of up to 4800bps. And it comes with the communications software you need to automate all your fax and modem routines.

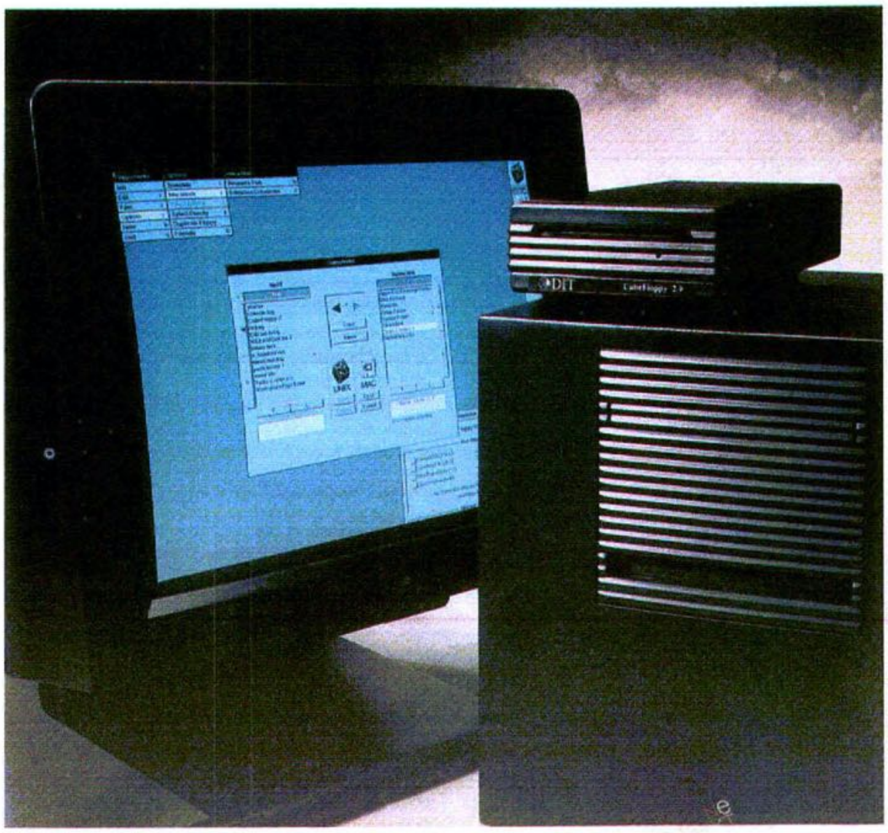
Abaton ... 30 day MBG		
8620	Scan 300/GS *(includes optical disk)*	**$1499.**
8665	InterFax	**489.**

DIGITAL INSTRUMENTATION TECH.

Rapid Transfers. Your NeXT can share files with other personal computers when you have **FloppyWorks**. This easy-to-use file-transfer software works with any NeXT floppy drive and can format, read, and write Mac, MS-DOS, NeXT, and OS/2 disks. With its intuitive interface, files from the hard disk and the floppy disk are displayed side by side (like the browser). And the built-in filters (translators) let you import or export data from all sorts of applications. Supported file formats include RTF, TIFF, WriteNow, WKS, WK1, SYLK, .wkz, .eps, .ps, and ASCII. It's the software you need for serious file sharing.

Don't have a floppy drive? Just connect DIT's **CubeFloppy** 2.9 with FloppyWorks to your NeXT via the SCSI interface and start reading and writing other popular computer formats (under NextStep 2.0). Or, if you need to read and write to Mac 800k diskettes, try CubeFloppy Plus with FloppyWorks. CubeFloppy 2.9 and CubeFloppy Plus are compatible with NeXT's Automounter so it's the easy, convenient way to add a floppy drive to your NeXT.

Digital Instrumentation Tech. ... 1 year warranty		
8656	FloppyWorks	**$185.**
8661	CubeFloppy 2.9 w/FloppyWorks	**579.**
8659	CubeFloppy Plus	**639.**
9027	DAT Tape Drive	**4995.**
9029	635Mb External Hard Drive *(5 years)*	**3749.**
9028	1.0Gb External Hard Drive *(5 years)*	**4995.**
9026	635Mb Hard Drive/DAT Combo	**5849.**
9025	1.0Gb Hard Drive/DAT Combo	**6795.**



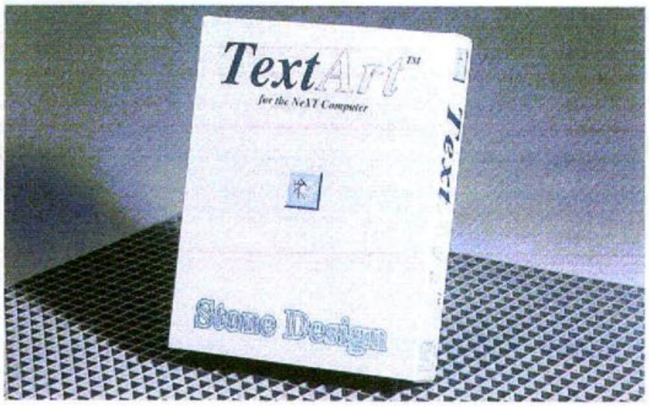
NeXTConnection

SUPERFLOPPY

Flexible floppy options. Make sure your NeXT can take advantage of the latest floppy technology with **SuperFloppy**. This 2.88 Meg drive delivers twice the capacity of current "high-density" drives and features a SCSI interface for quick connection to your NeXT. It accepts standard 720K DS/DD, 1.4 Meg HD, or 2.8 Barium Ferrite disks so it gives you the hardware compatibility you need to transfer data across different platforms (MS-DOS, OS/2, Unix, and even Mac files via MS-DOS). You also get advanced features like automatic sensing of disk capacity, auto eject/intake, and an external rotary dial for SCSI address selection along with NextStep 2.0 compatibility. Definitely a SuperFloppy for any NeXT system.

Peripheral Land

8547	SuperFloppy 2.88	**$449.**



TEXTART

Go wild with words! Use **TextArt** special text effects to create exciting logos and headlines and add flash to brochures. Wrap text around circles or arcs, rotate or skew it, fill letters with a variety of patterns, and add shadows, outlines, and color (with precise gray-scale control). You can also transform text into just about any pattern or shape. All just by clicking buttons and moving sliders. What you see on screen is exactly what you'll get from your PostScript printer right on screen, and you can zoom in for a closer look. Plus you can combine TextArt images with any PostScript or TIFF graphics. As *MacWEEK* (4/3/90) said, "If you use a NeXT system in the design of sophisticated layouts or logos, TextArt will become indispensable."

Stone Design

8658	TextArt	**$319.**
8666	TextArt *(optical disk)*	**549.**

PRODUCT INDEX

	Abaton ... 30 day MBG	
8620	300/GS Scanner *(optical disk)*	$1499.
8665	InterFax	489.
	Absoft	
8898	FORTRAN 77	839.
	Adobe	
8622	Plus Pack *(optical disk)*	299.
8940	DisplayTalk *(optical disk)*	629.
	Cables ... lifetime	
8906	SCSI 2 to 50 pin centronics	45.
	Digital Instrumentation Tech. ... 1 year	
8659	CubeFloppy Plus *(w/FloppyWorks)*	639.
8661	CubeFloppy 2.9 *(w/FloppyWorks)*	579.
8656	FloppyWorks	185.
8657	On Duty	$209.
9029	635Mb External Hard Drive *(5 years)*	3749.
9028	1.0Gb External Hard Drive *(5 years)*	4995.
9027	DAT Tape Drive	4995.
	Frame Technology	
8241	FrameMaker	799.
	Lighthouse Design ... 60 day MBG	
8621	Diagram!	349.
8660	Diagram! *(optical disk)*	call
8663	The Big Green Disk *(optical disk)*	249.
	Memory ... 2 year warranty	
8911	4 Mb x 8 80ns SIMMs *(set of 4)*	call
	Micropolis ... 2 year warranty	
8976	MC1598-15 External Hard Drive	3219.
8984	MC1684-7 External Hard Drive	1529.
	Pacific Microelectronics	
8244	Hard Drive Enclosure	$469.
	Peripheral Land, Inc.	
8547	SuperFloppy 2.88 *(requires cable)*	449.
8893	Infinity 40 Removable Cartridge Drive	929.
8888	300 Mb Wren Runner Ext. Hard Drive	2599.
	Sony ... 60 day MBG	
3298	DS/HD 1.44 Mb Diskettes	22.
	Stone Design	
8658	TextArt	319.
	T/Maker	
8679	Click Art *(optical disk)*	195
	WordPerfect	
8818	WordPerfect	329.
8859	WordPerfect *(5 user)*	1345.

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NXNW2

NeXTConnection™

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GatorBox

by **Rick Reynolds**

The GatorBox—an intelligent gateway in a platinum-tinted, free-standing box—links NeXT or other TCP/IP networks to AppleTalk or EtherTalk networks. AppleTalk, serial, and thick and thin Ethernet ports on the GatorBox (no twisted-pair as yet) provide the means for the physical connection, and a Motorola 68000 processor (running at 10MHz) and 1MB of dynamic RAM provide the capacity for monitoring traffic on the network, routing, and translating information packets, as necessary.

The basic package ($2795) includes the GatorBox itself plus GatorKeeper, software that provides the basic connection and a command-line interface for using simple UNIX commands to control the NeXT. Additional software, available in separate modules, allows the user to share printers and send e-mail to non-NeXT computers on the network, and provides a more intuitive interface.

GatorPrint ($595) translates the NeXT's "lpr" print commands (the standard for UNIX-based computers) into the LaserWriter's "pap" form, allowing NeXT users to control Linotronic and other imagesetters as well as LaserWriters on the network.

GatorShare software ($1995) is what makes the GatorBox truly useful. GatorShare connects AppleShare to UNIX's NFS file-sharing scheme, so that when a user on a connected Macintosh selects a NeXT server with the Macintosh's Chooser desk accessory, the directories appear as folders in the Macintosh directory window. To move files to and from the NeXT server, the user treats them like any Macintosh file, dragging them in and out of folders. Unfortunately, GatorShare does not support the reverse function; the user cannot mount a Macintosh folder as a directory in the NeXT workspace. All file manipulations must take place from the Macintosh.

GatorMail software ($995 for ten Macintosh users) routes e-mail between NeXTmail (or any other UNIX mail system using SMTP, the Simple Mail Transfer Protocol) to Macintosh packages such as CE-Software's QuickMail or Microsoft Mail.

The cost of GatorShare ($1995), added to the cost of the GatorBox ($2795), makes for a very expensive system. You could do the same thing for much less money, but it would take a lot more trouble. For instance, you could share files between NeXT and Macintosh computers by simply putting a modem on each computer and calling the NeXT from the Macintosh for a remote login, but dragging folders is much easier.

This is not to say that the GatorBox is trouble-free. The biggest drawback to the GatorBox is the arduous initial set-up process. Screen after screen of mystifying numbers and obscure settings quickly become overwhelming, and the cryptic error messages are of little help.

Once set up, however, the GatorBox works smoothly and reliably. And right now, it's the best option available.

Rick Reynolds *is executive director of the Bay Area NeXT group and owns a Macintosh and NeXT graphics service bureau in San Francisco.*

CONNECTIVITY

GatorBox

◆ ◆ ◆

A gateway for linking TCP/IP networks (like the NeXT's) to AppleTalk or EtherTalk networks. The system is expensive and almost impossible to set up without extensive help from technical support. Once connected, however, it performs reliably. The GatorShare software is the key to its utility, mounting NeXT volumes into the Macintosh filing system and enabling easy file transfer between platforms.

$2795 for basic configuration, $595 for GatorPrint, $1995 for GatorShare (includes GatorPrint), $995 for GatorMail (for ten users)

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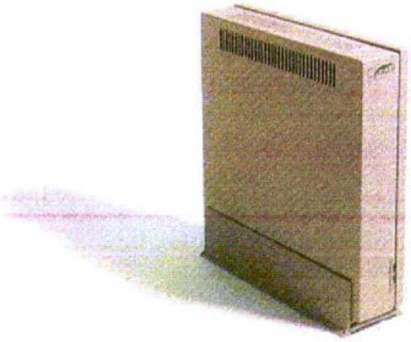


DM-N Digital Microphone

by Robert D. Nielsen

NeXT computers are noted for their exceptional built-in sound processing capability. The NeXT's DSP (Digital Signal Processor) handles and outputs CD-quality sound (44.1kHz). Unfortunately, the only standard analog input available through the NeXT's built-in microphone or microphone jack is 8kHz mono (speech quality). When sound quality or frequency response range is important, users will need another tool. Digital Microphone (DM), from Ariel Corporation, is one item from a category of products, called A-D, that address this need.

DM is a digital microphone with the stereo analog-to-digital (A-D) converter built into the handle. Stereo inputs in the bottom of the microphone take care of input from other sources, such as a standard CD or tape player. LEDs indicate recording levels out of range. A cable leads from the microphone to NeXT's DSP port. Of course, the entire unit is black.

For normal speech quality, DM performs no better than NeXT's built-in microphone, but it does a great job of providing high-fidelity sound input at higher sampling rates (the choices are 5.5125, 11.025, 22.05, 44.1, and 88.2kHz). The top end here handles twice CD-quality sound. The omission of a rate of 8kHz, to match sounds brought in through the microphone jack, is a glaring oversight.

Though DM represents a solid piece of hardware engineering, the ergonomics of the unit are a disaster. The 1-inch by 1.5-inch cross-section of its handle makes it clumsy to use. The clipping LEDs at the bottom are impossible to see when talking into the microphone, unless you hold it upside down and let the wires hang in your face. And because Ariel's recording software gives you no visual response during recording, you're forced into this awkward position.

Ariel's documentation (printed) seems to be a joint effort between UNIX nerds and DSP nerds. (Ariel ships no on-line documentation.) On the whole, the book is great for technical folks but bad for average users. It refers frequently to the "UNIX man" pages, and if you don't know what that means, you will have a problem. Sections describing cable printouts and DSP commands make this manual truly intimidating. If Ariel wants its products to be used by real human beings, it should consider getting a professional technical writer to split the documents into separate user and hardware engineer sections.

Unlike similar products on the market, DM does not come with its own software. Several programs that monitor and control input into the DSP port are readily available. NeXT provides a stripped-down sound recorder with NeXTstep 2.0. A free alternative is Rob Poor's excellent RecordApp. Metaresearch's Digital Ears software is available with or without its hardware. (Digital Ears will be reviewed in a future issue of *NeXTWORLD*.)

It seems clear that Ariel is a great hardware company that realized late in the game that it needed documentation to sell with its product—and then it greatly underestimated the effort required to accomplish this task. DM is not a useful product as a professional microphone, but it is very useful as a straight digitizer, despite its drawbacks. However, the current problems could be fixed with relatively little effort, and then it would be a terrific product.

Robert D. Nielsen *is an independent software consultant and registered NeXT developer.*

PERIPHERALS

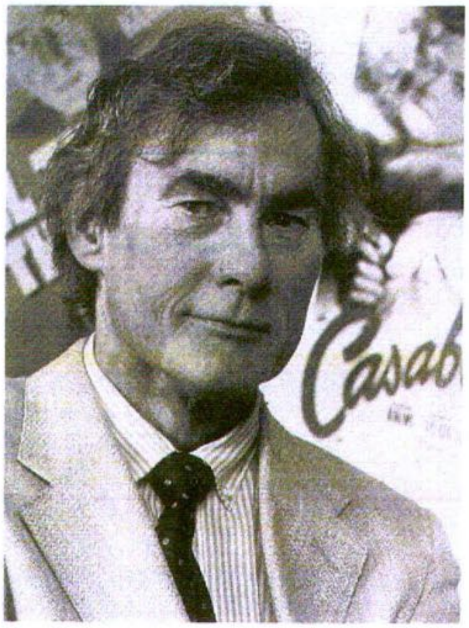
DM-N Digital Microphone

◆◆◆

Hardware that supplies analog-to-digital conversion for high-quality, high-frequency sound processing. The microphone provides great-quality sound input, but Ariel gave very little attention to its ergonomics and the accompanying documentation.

$595

Ariel Corporation, 433 River Road, Highland Park, NJ 08904. 908/249-2900



Living Technology/Theodore Roszak

In the Information Age, nothing has become more problematical than the meaning of *information* itself. In my youth the word was rarely used for anything more exalted than requesting a telephone number ("Information, please"); it now enjoys a mystique greater than reason, faith, or grace.

Pondering "life and the final state of the universe," the renowned cosmologists John Barrow and Frank Tipler conclude in their recent book *The Anthropic Cosmological Principle,* "Everything human beings do, not just their thinking, is purely and simply a form of information processing. It follows that every conceivable thought and action of any possible form of life is ultimately constrained by the physical laws governing the processing of information."

Accordingly, they imagine a time when some superintelligent species will use positronium atoms to store "an infinite amount of information." And that will be "the instant the Omega Point is reached," meaning the kingdom of God. Behind this apotheosis of information there lies some fascinating cultural history. In the late thirties, mathematician Claude Shannon of Bell Laboratories brainstormed a new approach to the study of communication. He called it "information theory." His goal was to find a purely quantitative calculus for the transmission capacity of electrical systems. This meant stripping "information" of its commonsense association with facts: discrete, meaningful units of thought. That colloquial connotation nevertheless continued to cling to the word like lint. When challenged to justify the divergent meaning his theory ascribed to *information* (why hadn't he chosen, say, *signal* or *sign?*), Shannon agreed that his usage might be "more trouble than it is worth." But before he could find a substitute (he later favored "communication theory"), minds as potent as those of mathematicians Alan Turing and Norbert Wiener had launched *information* on an exuberant new career. Turing believed that machine intelligence was just around the corner; Wiener was convinced that his new science of cybernetics (a theory of control and communication in the animal and the machine) had harnessed one of the fundamental properties of life and mind: the transfer and feedback of information.

Decoding life. Meanwhile, in another part of the forest, a revolution was under way. In the early fifties, the biologists James Watson and Francis Crick had deciphered the double helix, and with it, or so they thought, the basic chemistry of genetics. But scientists work from paradigms, which they may explore, exhaust, or discard; the new biology was no exception. The biologist Stephen Rose observes in his book *The Chemistry of Life,* how rapidly "biochemists seized on...the new sciences associated with the development of computers in order to probe the ways in which the cell...regulates its own metabolism." It seemed so obvious that DNA was a "code," the double helix a "bit-string" stored in the "memory" of the cell, the gene a "biocomputer" that was "programmed" to process "data" stored in the amino acids. By now the rhetoric is so familiar that we may not realize what a fateful act of cross-fertilization this was.

As revolutionary as the new biology may have been, the adoption of the computer paradigm had one highly conservative effect on the field. It simply took the old mechanistic picture of nature and applied it to living organisms. The technology involved might be state of the art (now including sophisticated means of programming, interaction, and feedback), but the philosophical assumptions underlying the model were as antique as the Newtonian world-machine. There is an irony here. Just as the new physics of Bohr, Heisenberg, and Schrödinger was leaving its mechanistic legacy behind, the machine image was about to find a home in the new biology—and soon after that in psychology, which rapidly adopted the computer as a model of the human mind. By the mid-fifties, it was common for people to speak of the mind in terms of "memory tapes" and "feedback" mechanisms, and to refer to themselves as "programmed."

However much the new biology may have borrowed from cybernetics, it repaid the debt handsomely by lending to information a glamour it might never have acquired in any other way. In effect, information, a once humble and nondescript piece of intellectual furniture, became the secret of life. From a data-processing mechanism as tiny as the DNA helix, all the subtle complexities of life on earth had evolved.

John Pfeiffer, in his book *The Thinking Machine,* called it "automation at the molecular level." Here was an astonishing demonstration of how much could be pieced together out of mere particles of data. The mechanistic model of the universe had always needed a subtler, more ingenious analogy than steam engines and dynamos to communicate the elusive mysteries of life. Even the clock, that oldest of smart machines, had never quite filled the bill as a convincing replica for the "jellyware" of the brain or cellular chemistry. The computer, especially as it got smaller and faster, was just the machine to save the mechanistic paradigm from extinction. The paradigm was now, however, left suspended precariously above the physicist's invisible domain of fields and energies and baffling probabilities. This was hardly the firm foundation of solid matter on which mechanistic science had always hoped to be based.

More than machine. It remains to be seen how far the computer paradigm can be pressed in biology. If the living cell is any sort of information processor, its intricacy is vastly beyond anything the most sanguine cognitive scientist could imagine simulating. In order to make a genuine comparison, try to visualize a computer program that could reach out into the material world to transform the hardware that contained it into an automobile, an airplane, a high-rise apartment building, and could do so smoothly, promptly, with a perfectly fluid grace. That is, roughly speaking, what happens to an embryo as it matures from a lump of cells into a viable organism. Along the way it even recapitulates the phylogeny of its species. The complexity and evolutionary memory involved here go well beyond decoding a bit-string.

But if biology has begun to exhaust the value of the computer model, computer science is far from finished with the biological analogy. What other machine besides the computer was ever spoken of as going through "generations"? Even more dramatic is the use that information technicians frequently make of the evolutionary paradigm. Genes may or may not process information, but the notion that computers "evolve" is deeply entrenched. Nor is the term always used metaphorically. There are those who see mechanical intelligence as, quite literally, a species in the making, well on its way to becoming more fit to survive than its human inventor.

Hidden within this gleeful but usually serious line of speculation is a revealing fascination with the "cult of antilife," which Lewis Mumford, in his book *Interpretations and Forecasts,* identifies as the dark side of industrial culture. "With the further development of cybernetic controllers to make decisions on matters beyond the range of...conscious human calculation, post-historic man is on the verge of displacing the only organ of the human anatomy he fully values: the frontal lobe of the brain."

Consider for example the psychological implications of the following scenario: Information technology reaches a stage at which individual human brains can be fully simulated and then downloaded into microchips. The body becomes dispensable; personal identity becomes obsolete. The world becomes a population of immortal and "multipresent" mental phantoms preserved in robotic shells. "In the final step your old body is disconnected. The computer is installed in a shiny new one, in the style, color, and material of your choice." Science fiction? Not at all. This is what Hans Moravec of Carnegie-Mellon University predicts enthusiastically. Mathematician and artificial intelligence expert Marvin Minsky likes the idea, too. "It's hard to see anything against it," he comments. "People will get fed up with bodies after a while." Minsky has worked his way to the conclusion that life has become a disposable concept; the future of biology lies with energetics and information processing—in short, with thinking machines.

In 1978 *Time* magazine turned to Robert Jastrow of NASA to provide the big picture for its major issue on computers. Jastrow used the platform to predict human obsolescence. The future of life on earth, he was certain, lies with "the child of man's brain rather than his loins....Human evolution is a nearly finished chapter in the history of life....We can expect that a new species will arise out of man surpassing his achievements as he has surpassed those of his predecessor, Homo erectus....The new kind of intelligent life is more likely to be made of silicon."

Not that there might not be a payoff for humans before this "intelligence beyond man" ushers us into a well-deserved extinction. Like Moravec, Jastrow looks forward to the time when the brain will make its home in a cozy box. In his book *The Enchanted Loom,* Jastrow predicts that any day now "a bold scientist will be able to tap the contents of his mind and transfer them into the metallic lattices of a computer." This he views as "the mature form of intelligent life in the Universe," the point at which the computer liberates the brain from "the weakness of the mortal flesh" and turns us into "a race of immortals."

Under the guise of hardware and software, a mind-body dualism as old as Pythagoras repeats itself in our time. But now the once religiously motivated asceticism comes mixed with a Frankensteinian arrogance. And that is an algorithm for the making of monsters.

***Living Technology** explores how information technology changes the way people work and live.*

***Theodore Roszak** is a professor of history at California State University, Hayward. He is the author of* The Making of a Counterculture, The Cult of Information: The Folklore of Computers and the True Art of Thinking, *and the science fiction novel* Bugs. *His latest work of fiction,* Flicker, *"a secret history of the movies," will be published by Simon & Schuster this spring.*

NeXTworking

by **Daniel Miles Kehoe and Seth T. Ross**

Don't be fooled by the graphical user interface, the built-in networking, or the elegant black casing. The NeXT computer is an IBM PC clone.

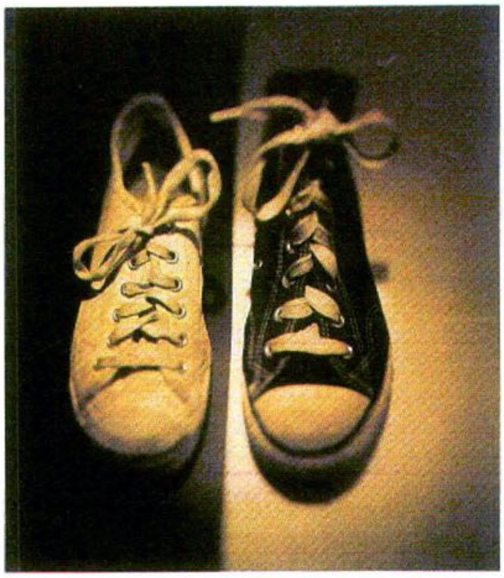
How does *NeXTWORLD* know? In preparing this issue's connectivity report, we plugged 3.5-inch and 5.25-inch floppy drives into the back of our Cubes and proceeded to run every PC application that we've bought, begged, or borrowed since 1982.

Why would we do such a thing? Other than for nostalgia's sake or a bizarre recidivism, you might think it ridiculous to use the NeXT, minus the richness of the NeXT interface, to run PC programs. Ridiculous, maybe, but realistic, for innovation must always exist alongside its own history. In the NeXT world, that history is DOS.

For practical purposes, business users still need their DOS applications and DOS-based data as badly as they need the potential power of the NeXT. NeXT recognized the need to clear a migration path for PC users by making NeXT computers as PC-compatible as possible (after all, NeXT needs business users!). NeXT has accomplished this by equipping every new computer with a DOS-compatible floppy drive. In addition, several vendors offer applications that ensure that DOS data will be accommodated by the NeXT.

Our first report in this issue's NeXTworking section tackles the problem of getting DOS or Macintosh files into a NeXT computer. There are a dozen different methods (see the table on the next page), ranging from Ethernet-based networks to the simple swapping of floppy disks. We begin a series of articles on the topic by looking at the simplest of PC-to-NeXT connections: file transfers via floppy disk. Future issues will take up more ambitious, cable-based connectivity.

The second report in this section looks at applications. Several application packages run on both the NeXT and a PC. Along with a handful of common file formats, this software forms the core of a transition strategy. Add Insignia Solution's SoftPC emulation software as a safety net, and any well behaved PC application will run on your NeXT computer. For more information on the NeXT-compatible products listed here, see Dock Soup in this and every issue of *NeXTWORLD*.



Sneakernet

The PC-to-NeXT migration path has been paved by NeXT's decision to install a 3.5-inch, DOS-compatible floppy disk drive in its new computers. Disks can now be taken directly from a DOS-based PC to a NeXT via "sneakernet"—meaning Eliot copies his data onto floppy, walks down the hall, and passes the floppy to Tiffany. Despite the attraction of more advanced forms of network connectivity, the workaday world of file sharing is still dominated by the prosaic combination of shoe leather and floppy disks.

Does this mean that all NeXT users can assume easy data exchange with the tens of millions of working PCs and Macintoshes currently running in businesses and homes? Not quite yet. Unfortunately, oodles of DOS floppy-disk standards exist side by side: There are proliferating combinations of disk sizes and densities. Further complications could stymie users who need data from a Macintosh.

In this article, we'll look at how NeXT has incorporated PC-compatible floppy drives into its platform, and we'll consider the routes PC and Macintosh users can take to transport their data to the NeXT.

Options for data transfer from DOS PCs or Macintoshes

	File transfer solutions	Possible from IBM PC?	Possible from MAC?	Requires extra hardware?	Requires extra software?	Notes
Via Sneakernet	3.5" 1.4MB/720KB DOS-format floppies	yes	yes	no	no	Original NeXTcube requires installation of a hard drive and System 2.0
	5.25" 1.2MB/360KB DOS-format floppies	yes	no	yes	no	Needs DaynaFILE external drive
	3.5" 1.44MB Mac-format floppies	no	yes	no	yes	Needs DIT FloppyWorks utility for NeXT
	3.5" 800/400KB Mac-format floppies	no	no	yes	yes	Forthcoming product form DIT will allow use of these disks
	Syquest 44MB removable cartridge	yes	no	yes	no	Needs removable cartridge hard drive product
Via serial cable	Dataviz MacLink Plus/PC	no	yes	no	yes	Dataviz application requires Macintosh
	UUCP via Direct cable	yes	yes	no	yes	Needs DOS application for UUCP connection
Via modems & phone line	Telecommunications applications	yes	yes	yes	yes	Needs two modems and telecom software
	UUCP via dial-up connection	yes	yes	yes	yes	Needs application for UUCP connection
Via Ethernet cable	Telnet/FTP link via TCP/IP	yes	yes	yes	yes	Needs DOS or Mac software for terminal emulation
	NFS server network via TCP/IP	yes	yes	yes	yes	Needs DOS NFS client software or gateway
	Novell server network	future	future	yes	yes	Needs software to make NeXT a Novell client
	AppleShare Server network	future	future	yes	yes	Needs software to make NeXT an AppleShare client

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- ☐ 12) NeXT
- ☐ 13) Unix workstation

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The NeXT floppy. Every NeXT computer now ships with a Sony MPX-111N floppy disk drive, a 3.5-inch disk drive that is "upwardly compatible" with the drives found on DOS-based computers. The drives use vertical (as opposed to horizontal) magnetization to read and write "extended" 2.88MB floppy disks, the new standard in the NeXT world. Although DOS machines with 1.44MB and 720KB floppy drives cannot read the 2.88MB floppies, the NeXT drive can read and write to lower-capacity 3.5-inch disks, offering easy data exchange.

NeXT's commitment to floppy drive data exchange is also manifested in the software that makes up the NeXTstep 2.0 operating environment—software that has the ability to read, write, and format DOS-compatible disks. When a DOS-compatible floppy disk is inserted into a floppy drive, it is mounted in the file system as /DOS. NeXT applications can read from and write to the DOS disk as easily as they can with a NeXT disk.

DOS formats. If your DOS-based PC has a 3.5-inch disk drive, transferring data to the new NeXT is a breeze: Just copy the files to floppies and walk them over to the NeXT.

For PC-to-NeXT file transfers, it is a good idea to stock up on high-density 3.5-inch disks formatted for 1.44MB of data (about $1.50 each at discount stores) or lower-cost, double-density disks preformatted for 720KB. Here's a tip: Blank double-density disks are not recognized by early versions of external drives supplied by PLI and Digital Instrumentation Technologies (DIT). What if your PC doesn't have a 3.5-inch disk drive? The simplest solution would be to add one. A disk drive that can format 1.44MB disks will likely cost under $100. If your PC can't be upgraded (PC floppy controllers ordinarily accommodate only two drives), or if you don't have a PC on site, you can add a 5.25-inch DOS disk drive directly to your NeXT. Dayna Solutions offers one such solution, the DaynaFILE external drive for the NeXT.

For our tests, we evaluated a DaynaFILE unit that contained both 3.5-inch and 5.25-inch drives. (The combination lists for $1105; a 3.5-inch drive can be purchased alone for $850, and a 5.25-inch drive for $750.) Floppies inserted into the DaynaFILE are automatically mounted and appear in the NeXT's File Viewer, one as /DOS, and another as /DOS2. The drive performed well with a variety of floppy disks formatted on different PCs, although it could not handle 2.88MB NeXT floppies.

Floppy drive solutions for DOS-based PCs

Disk formats	NeXT built-in drives	Dayna Dayna-FILE	DIT Cube-Floppy 2.9	Pacific Micro PM1.44	PLI Super-Floppy2.9	Notes
3.5" 2.8MB NeXT-format floppies	yes	no	yes	no	yes	NeXT-formatted disks cannot be read by PCs
3.5" 1.4MB/720KB DOS-format floppies	yes	yes	yes	yes	yes	Cannot format 720KB DOS disks on NeXT computers
5.25" 1.2MB/360KB DOS-format floppies	no	yes	no	no	no	May be cheaper to add a 3.5" drive to a PC
Syquest 44MB removable cartridge	yes	no	yes	no	no	Suitable for large files in excess of 1.4MB

Floppy drive solutions for Macintosh computers

Disk formats	NeXT built-in drives	Dayna Dayna-FILE	DIT Cube-Floppy 2.9	Pacific Micro PM1.44	PLI Super-Floppy2.9	Notes
3.5" 2.8MB NeXT-format floppies	yes	no	yes	no	yes	NeXT-formatted disks cannot be read by Macs
3.5" 1.4MB/720KB DOS-format floppies	yes	yes	yes	yes	yes	Requests late-model Mac with Superdrive, Apple File Exchange
5.25" 1.2MB/360KB DOS-format floppies	add s/w	add s/w	add s/w	add s/w	add s/w	Requires DIT FloppyWorks utility for the NeXT
3.5" 800/400KB Mac-format floppies	no	no	future	no	no	The Mac Plus and early Mac SE can only use 800/400KB disks

When files don't fit. Although the new 1.44MB floppies can store larger files than ever before possible on a PC, you'll still encounter files that just don't fit.

If your PC and NeXT computer are at the same site, and you transfer large files regularly, it's time to give up on sneakernet and install an Ethernet-based network. The speed and convenience will justify the expense of the necessary PC Ethernet adapter card, cabling, and software.

If your PC and NeXT are not at the same site, try using a DOS backup utility that splits files between floppies. Run the same utility on the NeXT with the help of Insignia Solution's SoftPC (discussed below in "Sister Applications") to reassemble the pieces. If a file is just a little too big, it's best to use an archiving utility such as PKWare's PKARC to compress and restore the file.

Macintosh to NeXT. Unfortunately, the NeXT operating system cannot recognize Macintosh-formatted disks. Fortunately, late-model Macintosh computers support DOS-formatted 3.5-inch, 1.44MB disks.

Owners of the Macintosh Plus and early Macintosh SEs (ones that shipped before August 1989) are not so lucky. These early Macintoshes accommodate only 400KB or 800KB Macintosh-formatted disks. For the time being, owners of such machines must transfer files via serial cable, modem, or an Ethernet-based network.

Even if you have a late-model Macintosh, you'll find transferring files on disk more difficult than from a DOS-based computer. You'll need to write to DOS-formatted 1.44MB disks from your Macintosh, not native-format Mac disks. And since DOS disks appear as blank, unformatted disks when they are inserted into a Mac disk drive, you'll need to use the Apple File Exchange utility to read them. (You'll find the Apple File Exchange utility on the System Additions disk or the Utilities 2 disk that came with your Mac.) Alternatively, you can purchase the $89 Dayna DOSMounter, a Macintosh application that makes it easy to read, write, and format 1.44MB DOS disks from the Macintosh desktop.

A word to the wise. Although Macintosh hard drives are SCSI devices, don't try connecting a Macintosh drive to the NeXT's SCSI port to transport files. You will be able to make the connection, but when you do, the NeXT will attempt to initialize the disk in the NeXT format, destroying your files in the process. (The NeXT will ask you before it begins reformatting.)

Other solutions are possible with the addition of third-party products. This spring, Digital Instrumentation Technologies (DIT) will introduce an external drive and software system for the NeXT that accommodates 800KB and Macintosh disks, as well as 1.44MB DOS or Mac disks—but not, unfortunately, 2.88MB NeXT disks.

DIT provides another nifty solution in the form of a utility, named FloppyWorks, that allows your NeXT to read, write, and format 1.44MB Macintosh disks. It works both with the NeXT's internal drives and with external drives offered by third parties. DIT sells FloppyWorks either with the CubeFloppy 2.9 drive ($680) or as a stand-alone application ($250). Pacific Microelectronics includes a Mac-disk-reading utility with their PM1.44 external drive for the NeXT ($395 for drive and software). The company plans to release the software separately but has not announced a price.

For the floppyless NeXT. We can't forget that NeXT has been selling computers for the last two years that have no floppy drives at all. If owners of the original NeXTcube want to exchange data with new NeXT users or install commercial software packages (which will ship on floppy disks), they will need a floppy disk drive.

Two external floppy-drive products are suitable for the original NeXTcube: the CubeFloppy 2.9 from DIT (list price $520) and the SuperFloppy 2.8 from PLI (list price $499). Both the DIT and PLI products conform to the new 2.88MB standard. Two other external floppy-drive products, from Dayna Communications and from Pacific Microelectronics, do not support the new 2.88MB standard and thus will be of limited value for NeXT-to-NeXT file exchange.

Beyond sneakernet. If you've got a floppy disk and two compatible floppy drives, you can exchange files. There's no hardware to add, no network software to configure. If you use a PC or Mac at home and a NeXT in your office, transporting a file on floppy disk is as easy (or difficult) as remembering your lunch.

Of course, floppies are fumblesome. If a PC or Macintosh is close to your NeXT computer, it may be more convenient to add a simple serial cable (or even an Ethernet adapter), plus communications or networking software, and transfer data directly from machine to machine. Future NeXTworking coverage will address these alternatives.

Caveat Ejector

DOS and Mac users should be aware that the NeXT operating system is far fussier about ejecting disks than DOS or the Macintosh system.

When a floppy is inserted into a NeXT floppy drive, NeXT "mounts" the disk and integrates it into the file system (this may take several seconds). Once a disk is mounted, there are two easy ways to eject it: You can use the Eject option in the Workspace Manager's Disk menu or you can drag the floppy icon from the File Viewer into the Recycler, which functions like the trash can on the Macintosh. Note that the operating system will not eject the floppy disk if any file on the disk is being used by any application.

Under no circumstances should you ever physically remove a floppy disk without properly removing it from the file system. Recognize, however, that if you forcibly eject a disk before the operating system has cleanly unmounted it, data on the disk may be damaged. The next time you insert the disk you will see an alert panel asking if you want to initialize or repair the disk.

Sister Applications

If every computer shared the same data and offered the same applications, moving from one computer to another would be merely commuting. It's not yet that easy. Once you bring a file over to the NeXT, what will you do with it? The subsequent key element in the migration between the NeXT and other platforms is application compatibility.

If the same applications were available on the NeXT as on the original platform, files created on one machine would instantly open on another, without any loss of information, even the most complex formatting. A user could go to work immediately, without any retraining. A document would appear on the screen (or printer) with as much similarity as the different equipment would allow. Right now, the biggest problem for any migrating user is the fact that applications are not identical on different platforms.

The good news is that several compatible—if not identical—"sister" applications exist on both the PC or Macintosh and the NeXT. In addition, several data formats that are supported across platforms provide a common language for the exchange of data. Finally, users can turn to SoftPC, an emulation utility from Insignia Solutions, which allows DOS applications (but not Macintosh packages) to run on the NeXT.

Given these three alternatives, is migration really practical? To find out, *NeXTWORLD* tested applications with imported data in four broad categories: text, graphics, spreadsheets, and vertical-market applications. We found traps and pitfalls, vanishing graphics, and a few other surprises. We also discovered that if users are willing to learn new tricks and recall a few tips, a successful migration is possible and practical.

Words and formats. Fortunately for PC users—and a few Macintosh users—WordPerfect has come to the NeXT. The NeXT version incorporates all the functionality of WordPerfect 5.0 for the PC or Mac, and files created on the different platforms are identical.

The only problem in switching platforms is working with a different interface. WordPerfect for the NeXT obeys all the graphical conventions of NeXTstep. All commands are accessed from a main menu rather than from function keys. Users must forget the keystrokes they learned in order to operate WordPerfect on their PCs and learn NeXT's keyboard shortcuts instead.

It's easy to work with graphics in the NeXT version of WordPerfect. To incorporate an Encapsulated PostScript (EPS) or TIFF (Tagged Image File Format) file into a WordPerfect document, you simply locate the graphics file in the File Viewer and drag its icon into the document. But this graphics proficiency offers another obstacle to migration: Graphics placed in your document on the NeXT will not appear when you return the document to the PC. EPS graphics print on your PC's PostScript printer, but most TIFF graphics are gone forever.

You may encounter another hitch when it's time to print your NeXT WordPerfect file from your PC. The NeXT computer supports PostScript printers exclusively. If you don't have a PostScript printer attached to your PC, you may find that the NeXT fonts differ from those available on your HP LaserJet, your Epson LQ-1000, or that brand X device your predecessor brought in. In such cases, expect changes in character widths, line endings, and pagination—and extensive reformatting. Strictly speaking, this problem has nothing to do with WordPerfect, but it illustrates the current obstacles to easy migration.

Users of WriteNow on the Macintosh are lucky. Operations are almost identical and formatting is preserved across platforms. If you use any other word processor, for example Microsoft Word or PC KrispWrite (the word processor that came free in a box of cereal) your migration solution may teeter on the capabilities of a lingua franca such as ASCII or rich text format (RTF).

Any word processing document created on the PC or Macintosh can be saved as ASCII text and read by Edit, WordPerfect, or WriteNow on the NeXT. The drawback of ASCII is its limited ability to record document formatting. You'll transfer text, but you'll lose margin settings, tabs, and font information like boldface and italics.

To overcome the limitations of ASCII, Microsoft Corporation has fostered RTF. Though it is supported by many NeXT applications, not all applications utilize the format fully. For example, WriteNow ignores RTF page dimension and margin data.

Interestingly, it is the more finely formatted desktop-publishing files that may most easily cross platforms. For example, files created for $\mathrm{T_EX}$, the academic community's high-end publishing application, can be easily transported among versions of the program found on DOS-based PCs, Macintoshes, and UNIX workstations, including the NeXT.

Frame Technology's FrameMaker, the most popular publishing package for the NeXT computer, has been ported to the Macintosh and to many workstations, though not to the PC. Frame offers format-translating "filters" that will read many word processing files in all their richness. If your ultimate destination is a Frame document, you'll need no other translation. You may even be able to transfer the bulk of a formatted PageMaker or Xerox Ventura Publisher document into FrameMaker by massaging "tagged text" into the Frame "Maker Markup Language" or by programming a "Maker Interchange Format" filter. This process, however, is arduous, and may not be worth your time.

Graphics interchange. The world is waiting for a counterpart to WordPerfect for graphics. Adobe Illustrator, with versions for the PC, Macintosh, and NeXT (announced, but not yet shipping) may achieve hegemony. In the meantime, Adobe offers a lingua franca in the form of the EPS format. The NeXT's use of PostScript for all imaging means that EPS files created on PCs or Macs find a ready home in any NeXT application that supports graphics.

Before you begin migrating with EPS files, however, bear in mind that EPS graphics cannot be easily edited. It is possible to open and edit the files in NeXT's demo application Yap, but this option is reserved for those willing to hack PostScript code.

EPS graphics are transferred as ASCII text files. Keep in mind that on the PC, lines of text end with the ASCII CR/LF "invisible character" combination. In most Macintosh applications, lines end with the CR character. Traditionally, UNIX applications expect an LF character at the end of lines. PostScript code will become unreadable if end-of-line characters are not converted properly. Some applications make the conversion automatically, but some require use of a translation utility such as that provided in DIT's FloppyWorks. If no translation utility is at hand, troublesone EPS files can be cleaned up with UNIX utilities such as sed, a "stream editor."

Here's another tip: When exporting EPS files from Aldus FreeHand (a popular Macintosh illustration program), you'll have a choice of three picture formats: none, Macintosh, or IBM PC. Choose "none" if you want to use your files on the NeXT.

NeXT also supports TIFF. Not every application implements the TIFF in a uniform manner. A TIFF file created on a Macintosh or PC might work fine in a NeXT application but it might not work at all in another.

Very few PC graphics formats are supported on the NeXT, leaving out graphics generated by AutoCAD, GEM Paint, GEM Draw, GEM Graph, PC Paintbrush, or in CGM format. Ditto for two popular Macintosh formats: MacPaint and PICT. You'll need to hunt down applications or utilities that can translate these idiosyncratic formats to the TIFF or EPS common languages. Macintosh PICT files can be opened in FreeHand or Adobe Illustrator and exported as EPS files (though you may be reluctant to purchase a $495 application for this capability alone!). To work around this, you can capture PC graphics by running your application under SoftPC and snapping a screenshot using the NeXT's Scene demo application.

Spreadsheet exchange. Lotus Improv translates files from its PC sister application 1-2-3, while Informix's Wingz has sister applications on the Mac and for Microsoft Windows. All NeXT spreadsheets read the ubiquitous Lotus WK1 format, and Wingz will import or export Excel files.

Lotus 1-2-3 and Lotus Improv are functionally similar. In a sense, Improv wraps around a 1-2-3 core. That core is every spreadsheet you've ever created, or that can be exported to a 1-2-3 format. Lotus knew no one would buy a new spreadsheet tool if they were required to re-create their past work from scratch.

Lotus Improv offers distinct advantages over its PC sibling (see the review in the premiere issue of *NeXTWORLD*). But how do cell-related formulas in 1-2-3 worksheets translate to Improv's English-language formulas? With a little elbow grease. Improv makes a best-effort attempt at translation and will run a mechanically translated formula with no surprises, but the user must review and rewrite each formula if it is to become easily understandable. Don't begrudge the effort required. During this process, several early users of Improv turned up errors in their 1-2-3 spreadsheets that had lain dormant for years.

But 1-2-3 power users also rely on well-stocked libraries of macros for everything from calculating depreciation to setting up data entry screens. Improv does not support macros (at least in version 1.0). Put bluntly, this could torpedo any portability between 1-2-3 and Improv, if 1-2-3 macros are an essential part of your everyday business. Improv's broader features set and expanded library of financial functions may take the place of a few well-worn macros, but there are many macro functions that simply cannot be duplicated. This means that Lotus users must carefully weigh the benefits of migration to Improv.

Spreadsheets exchanged among versions of Wingz won't require the massaging that the Lotus 1-2-3 and Improv combination requires. But the ease of data exchange among Wingz users is offset by Wingz's lack of popular acceptance. Chances are, if you use Wingz, you'll still regularly save spreadsheets in Lotus 1-2-3 or Excel format.

SoftPC, the universal solvent. Of course, there are thousands of PC applications that do not speak a common data format and for which there are no sister applications on the NeXT. If you rely on a vertical-market application that is used only in the widget-working industry, don't worry, you can still migrate to the NeXT. The solution is the PC-on-a-disk from Insignia Solutions—SoftPC. Running SoftPC on a NeXT enables the machine to run any well-behaved DOS software.

SoftPC duplicates a hardware PC down to the quirkiest idiosyncrasy (for more information on SoftPC, see the review in this issue). There is a C: drive and a D: drive (limited to 32MB, just like DOS requires). There's a licensed version of Microsoft DOS 3.3 (and if you want, you can install DOS 4.0). There's your choice of EGA or CGA screens. There's also a full set of parallel and serial ports (connected to the NeXT serial ports or to any UNIX device, process, or file).

The only limit to SoftPC is a physical one. There are no slots to plug in PC bus cards, so if your software looks for a Western Digital Ethernet card, or a Truevision Targa board, it won't find it. But that shouldn't be an obstacle.

To solve the problem posed by different keyboards (the NeXT keyboard has no function keys, page up, page down, break, and other assorted keys), SoftPC presents a menu of keyboard equivalents. Quick-fingered PC operators are sure to find this kludgy, and we found that PC applications that eschew the function keys are best suited to SoftPC. Programs such as WordStar 6.0, which relies on Crtl-key combinations, and ProComm Plus, which relies on Alt-key combinations, fall into this category.

SoftPC is fasted with character-based applications. Graphics applications, such as Xerox Ventura Publisher or Aldus PageMaker under Microsoft Windows 3.0, run unacceptably slowly on older 68030-based NeXTcubes. On a 68040 NeXT machine, you may be able to clunk along. It's a truth we've always known: a PC clone—including the NeXT with SoftPC—is fine for character-based applications, but it's better to run graphics on something else.

How is DOS on the NeXT? Better than it was: We ran two or three applications at once and never needed to reboot the computer. It was clone heaven, and an afterlife that DOS may not deserve.

Daniel Kehoe *and* **Seth T. Ross** *are* NeXTWORLD *contributing editors.*

The NeXT World

Edited by Dan Lavin and Charles L. Perkins

New machines, new users, and new software have the NeXT community buzzing. Our user group section in this issue reports generally on user group activities around the country. In coming months we'll reprint news from group newsletters and activity reports. Thanks to Conrad Geiger, user group guru from NeXT, for collecting the news this month. This month's report from comp.sys.next shows the growth of that newsgroup and the excitement generated by the new machines. This section is your ear to the ground.

User Groups

The NeXT user group community is growing faster than the installed base—an indication that many people out there have just ordered one of NeXT's new products. Six months ago, NeXT counted 35 NeXT user groups worldwide. Today there are more than 70. Groups are located in the United States, Canada, Mexico, Japan, Australia, France, Sweden, and the Netherlands. Their combined membership tops 5000.

One of the newest groups, SCaN (Southern California Area NeXT Group), has had regular meetings at various locations around Los Angeles to accommodate the five NeXT groups in that area. SCaN president Michael Mahoney will have an IBM RS/6000 at the February meeting to show off NeXTstep. The December SCaN meeting featured the 22-minute new product video that NeXT has provided to all groups.

Many of the new groups have started in locations where there had not previously been many NeXT machines. These groups, such as the Texas A&M group, have as many as 40 to 50 members now. Other groups, like the San Diego group, have been working to set up electronic bulletin boards for group access.

Bill Parod of the Chicago group reports that they are planning a 24-hour user access room with a NeXT for their members. Following a national trend, they see a bigger emphasis on user, as opposed to developer, issues in their meetings.

NeXT has effectively made developers aware of the existence of user groups, resulting in memorable meetings with WordPerfect, Oracle, Frame, and Lotus, and new companies such as Objective Technologies, RightBrain Software, and Lighthouse Design.

comp.sys.next

Watching the net news fly by is a wonderful way to find out things as they happen, often before they are announced and certainly before newspaper accounts confirm them. Of course rumors abound, but the experienced news reader can usually sniff out the real thing. In the past few months, we've had news when Release 2.0's golden master was cut and began duplication, and when 2.0 software upgrades and their 68040 hardware counterparts began to arrive. We got early announcements of the new 200MB drive (for buyers who want Release 2.0) and of the substitute 400MB drive and the discontinuation of the 340MB drive (for buyers who want Release 2.0 Extended), the first dribbling shipments of the new 68040 hardware (including some as early as November 30 of last year), and volume shipments of the new machines, which began as early as December 15 and have continued ever since.

Note: *NeXTWORLD* does not vouch for any of the products or services mentioned here; treat this information as you would any on-line posting.

Memory. Some comp.sys.next correspondents have tried various configurations of the new SIMMs. The rule seems to be, mix and match in sets of four SIMMs and you'll be fine. You can mix 1MB and 4MB SIMMs, different memory speeds, and even parity and nonparity memory (errors during self-test can be ignored). Also, be sure when ordering 4MB SIMMs to specify *ultra* low-profile, since many low-profile SIMMs are still too high to fit properly into the NeXTcube. A sampling of prices for 1MB SIMMs: $43 from Peripheral Outlet in Oklahoma, at 800/332-6581, and $45 from Micro Electronic Technologies, at 800/766-SIMM. Prices of 4MB SIMMs have been dropping since December, from $195 to $193 to $189, the most recent price posted for Peripheral Outlet, at 800/332-6581. Be sure to ask, when ordering from any company, whether it is certain its SIMMs will work with the NeXT computer.

Disk drives. An ongoing discussion about third-party disk drives has continued these past few months, with about an equal number of successes and horror stories. The bottom line seems to be that unless the disk drive you want to buy is already listed in NeXT's /etc/disktab file, or is known by a friend to work with the new 2.0 BuildDisk, caveat emptor. Of course, if you eat disktab entries and SCSI sense modes for breakfast, then you can order just about any mail-order disk drive, use the new 2.0 command "sdform" (or any other low-level formatter) to format it, and build a new disktab entry for it yourself. The new and supposedly automatic one-partition build of any SCSI disk supplied with 2.0 is known to fail for several drive types. Even if it's successful, it will take some knowledge of UNIX to complete, since the /etc/fstab shipped by NeXT assumes two partitions. For less experienced users, third-party hard-drive solutions are starting to emerge.

The X in NeXT. Continuing X Windows vs. NeXTstep wars have heated up, with many newsgroup posters questioning NeXT's strategy and intentions regarding X support. Although many agree that NeXTstep is superior in most categories of comparison, interoperability across platforms was considered by many to be justification for a good X port. Several NeXT employees even wrote directly to one poster to clarify that NeXT's position was not to discourage all X implementations (showing NeXT's laudable network presence). Most discussions ended when the announcement of a $149 commercial server by Pencom Software was posted. Free versions of X had existed for the NeXT but were not yet robust.

Performance. Along the same vein, Sun vs. NeXT vs. DEC vs. IBM benchmark and price/performance arguments have continued, with more data coming in daily. Everyone seems to agree that NeXTdimension is by far the best buy for a high-end color workstation, but without solid SPECmarks, Whetstones, Dhrystones, or LINPACK numbers, no one can be certain exactly where the 68040 NeXT belongs. It is generally agreed that it can beat out the SPARC-1 and 1+, some show it beating the DECstation 3100 in raw speed by more than the differential MIPS rating, and many show it below the MIPS and RS/6000 series. For comparison of the type of speeds being measured, one posting placed the NeXT at eight to ten times the speed of the Macintosh IIci. In price/MIP, the NeXTstation comes out on top by almost any measure. NeXT appears to have been conservative in its ratings of the new machine, claiming the low ends of the 15–20 MIPS and 2–2.5 MFLOPS ranges published by Motorola; recent postings indicate as much as 17 MIPS. (See "Station to Station" in this issue for *NeXTWORLD*'s benchmarks.)

Net news. Many posters were curious about acquiring network connectivity at home. Several options were discussed and are summarized here. UUCP, a simple store-and-forward mail and file-transfer system, is included with every NeXT but is not officially supported. If you or a friend have a lot of UNIX experience, and you have a friendly UNIX machine on the network nearby, getting mail access to the network is free. If you aren't an expert, full UUCP service is provided by Portal Communications, at 408/973-9111, for $34.95 per month plus $1.95 per hour of connect time. Other providers include Los Angeles's UUNET Technologies and CERFnet's DIAL n' CERF. For more interactive, direct Internet connections, you must have SLIP, or Serial Line IP, the internetworking protocol (IP) in TCP/IP. SLIP is currently unavailable in 2.0, and exists for 1.0 only in an unsupported under-the-table version. With SLIP software for your NeXT, the machine on the other end of the Internet must be running SLIP, too. Several third parties and some net posters have mentioned implementing SLIP for 2.0, but none has done it yet. NeXT has mentioned that SLIP (or PPP, a fancier version of SLIP) may be included in 3.0. Lack of SLIP support is a major shortcoming of 2.0. Without it, Internet connections are possible only at the office and not at home.

In search of ODs. Over the months, several possible supplies of cheap optical disks for the NeXT have emerged. NeXT itself, at $149 per disk, remains the cheapest official supply of single-sided ODs, but special deals with Canon and its various distributors have led to occasional price deals as low as $80 per OD. If you want to ask about ODs, call NeXT, Mass Micro Systems (Northern California), or MicroNet Technology (at 714/837-6033). Mention Canon optical drive model MO502M when ordering. One big surprise: *two-sided* ODs are now available for $188 from Maya Computer, at 800/541-2318. Vouched for by posters on comp.sys.next, they probably offer the best prices, since you get 512MB of usable storage for about the same price as the 256MB on the standard single-sided ODs. Kudos to Brad Gulko (turing@saturn.ucsc.edu) for his tireless efforts in tracking the wily OD for comp.sys.next readers.

Backwardly speaking. Various netters posted that they had seen SoftPC (the PC emulator for the NeXT) running on '040 hardware at about 10MHz AT speeds and report that it looked like a real, finished product (a little glitchiness in the screen updates might be due to its Beta status). Dave Hull (quark@asylum.sf.ca.us or 408/522-7604) is NeXT's support person for SoftPC. He posted this as its features: 80286 CPU and 80287 FPU (both real mode only); 640K RAM; EMS 4.0 expanded memory; CGA or EGA video; Microsoft Mouse; 101-key keyboard; COM1, COM2, LPT1, and LPT2; 2 MS-DOS hard drives (C & D); multiple FSA disk volumes; generic ASCII terminal driver. Another poster plans to write an ADI display driver for Insignia's "video" system (emulation, of course) and that "the rep for Insignia told me that it runs rings around the SPARC version, for some reason. I didn't get into why that might be."

Here and there. Here are some other small items mentioned in the net discussions:

- Rumor has it that NeXT is finishing Interface Builder's Database Kit and will be distributing it at cost.

- Many postings about NeXTdimension questioned its apparent video resolution limitation of 640 x 480, but others showed excitement about the announcements of frame-editable and computer-controllable home VCRs on the horizon.

- NeXT has made NetInfo sources available at cost. This supplements the GNU sources already available at cost, and the Mach sources, which cost $10,000 due to licensing issues. Now NetInfo has a chance to become a de facto standard like NFS.

- New Usenet news reader applications supporting RTF (rich text format) are being written, though acceptance of this brave new world is slow in coming even in comp.sys.next.

- An exciting extension to Draw that allows for multiuser interactions and conferencing is available from jfreem@uncecs.edu (Joe Freeman), heralding the start of truly interpersonal applications on the NeXT.

- The new NeXT keyboard shipping with the new hardware has been given consistently low marks by the UNIX/hacker community; loss of some useful special keys from the main keyboard and a cheaper feel are the main complaints.

- Distribution strategy reared its ugly head again: Many users have no floppy disk drive yet but are expected to receive all future software that way, even from NeXT. Cheap floppy disk drive solutions still do not exist.

- The $\mathrm{T_EX}$ in Release 2.0 is version 3.1 and includes a good version of dvips. ■

Dan Lavin *is technology editor of* NeXTWORLD *and co-director of the Boston Computer Society (BCS) NeXT group.* **Charles L. Perkins,** *a senior associate with Marble Associates, is a contributing editor to* NeXTWORLD.

NeXT Question

Edited by **Bruce Blumberg and Eric Larson**

In this department we provide answers to your questions about the NeXT, along with helpful hints and tips. Because we had to prepare this column before the first issue hit the newsstand, we had to glean questions once again from our archives, from NeXT's publication *NeXT Answers*, and from asking around.

Our third issue will feature your questions. Please send them to NeXT Question, *NeXTWORLD*, 501 Second Street, San Francisco, CA 94107, or by e-mail to dlavin@nextworld.com.

FOR USERS

Q. How can I customize the login window?

A. The original TIFF file for the login window is in /usr/lib/NextStep/nextlogin.tiff. Here are the instructions to customize it:

Open a Shell or Terminal as root and run the following commands:

```
myhost#cd /usr/lib/NextStep
myhost#cp -p nextlogin.tiff nextlogin.tiff.orig
myhost#open nextlogin.tiff
```

The last command will launch Icon. You can use Icon to edit the TIFF file that makes up the login screen. However, the new TIFF file should have the same dimensions as the original and should have no alpha channel. The new one should also include white fields for entering text in the same places as the original.

You can place the new TIFF file in the directory of your choice. To notify the WindowServer of the new location of the file, run the following command in a Shell or Terminal as root:

```
myhost#dwrite loginwindow ImageFile /me/mylogin.tiff
```

where */me/mylogin.tiff* is the path and filename of your login TIFF file.

Q. Of course I love the British woman in my printer, but on the off chance that I ever get tired of her, how can I change the voice alerts for my printer?

A. The voice alerts are in the directory /usr/lib/NextPrinter. There are four of them:

manualfeed.snd "Your printer is waiting for paper."
nopaper.snd "Your printer is out of paper."
printeropen.snd "Your printer cover is open."
paperjam.snd "Paper is jammed in your printer."

These are ordinary CODEC-based sound files (the standard NeXT microphone input). You can replace them with your own recording. Just record a sound, using any sound-recording program (such as SoundPlayer, a NeXT developer demo program that comes with NeXTstep 2.0 Extended) and name it something like /usr/lib/NextPrinter/manualfeed.snd. (The execute bit need not be on.)

Q. When I click the Close box in a WriteNow document without saving the file first, a Save panel appears, asking if I want to save changes first. One of the options in the panel is Save/Compact. What is that option for?

A. WriteNow preserves the previous version of a document in the .wn file, along with the changes from that version to the current version. This enables WriteNow to "undelete" text. However, to save disk space, or, for security reasons, to ensure that deleted text is really gone, you can use the Save/Compact option, either by clicking that button in the alert panel or by holding down the Alternate key while you save (Alternate-Command-s). Note that after you've done this, the Revert to Backup command in the Document menu is dimmed. The backup copy is no longer available. When you close the file, you will see a panel come up briefly, saying, "Reclaiming space in document."

FOR DEVELOPERS AND ADMINISTRATORS

Q. Is 1.0 NetInfo compatible with 2.0?

A. 1.0 and 2.0 NetInfo are functionally completely compatible—you can mix 1.0 and 2.0 NetInfo servers as you wish. However, there is a difference between 1.0 and 2.0 NetInfo databases. 1.0 NetInfo data files are upwardly compatible to 2.0, so that you can move a NetInfo database from system 1.0 to 2.0, but you cannot move a file from system 2.0 to 1.0.

Q. The Services menu in NeXTstep 2.0 applications provides hooks for applications to "publish" functions that can be used in other programs. Can you give a quick overview of how this is done?

A. The following excerpt, from a NeXT "White Paper" by Bruce Blumberg, discusses developing applications under and porting them to 2.0. It should answer your questions. Warning: This is a rather lengthy discussion, geared to the technically knowledgeable.

Services

A new facility has been added to the Application Kit to support a specific type of interapplication communication called Services. An application provides a service to another application by performing some operation on data that the other application passes to it via a pasteboard. A user invokes a service by choosing a desired service from the Services menu. The application then performs some operation on the data contained in the pasteboard, such as finding its definition or performing OCR (optical character recognition) on TIFF data.

The neat thing about the way Services has been implemented is that as long as the application providing the service accepts a standard pasteboard type, the requester need not know about the service in advance. Services that accept a particular application's pasteboard type will automatically show up in the Services menu. In addition, the only menu items that will be enabled at any given time are those services that accept the pasteboard types provided by the firstResponder or one of the objects in the Responder chain in the key window.

You can choose whether you want your application to simply be a client of services provided by other applications, or whether you want it to provide services to other applications as well.

What should become a service? Services are not intended as a replacement for either Copy/Paste or Speaker/Listener. Services are intended for situations in which your application will perform one atomic operation on the provided data, such as including a document in an e-mail message.

Operations that can be described as a verb in a menu item (for example, Define) are excellent candidates. Operations that require additional arguments, or weird pasteboard types, are not. After all, one of the key advantages of Services is that if you provide a service for a standard pasteboard type, most applications will be able to take advantage of your service automatically. If, however, you define a unique pasteboard type such as MyWickedExcellentPasteboardType, there are going to be very few applications indeed that will have your service in their Services menu.

Being a Services client comes without requiring significant extra coding whenever you have a Services menu and the firstResponder is an instance of the Text class. If you have other objects that can be selected by the user, copied and pasted, and represented on the pasteboard via a standard pasteboard type, then it shouldn't be difficult to add the necessary support to act as a Services client. To be a Services provider requires a bit more work, but just think of the marketing advantages of having the user see your application's name in every Services menu on the machine!

Although the Appkit release notes describe Services in some detail, here is a quick overview: An application publishes the services that it is willing to provide by adding a __ services section containing a description of its services to its __ICON segment of its executable. Note, if your application simply acts as a Services client, you obviously don't have to do this. This information is digested by the Workspace Manager at log-in time and is made available to other applications. Included in the description of the service are the pasteboard types on which the services can be performed.

On the client side, the Application object is responsible for managing the Services menu and invoking the appropriate service when the user selects an item from the Services menu. In order for this to work, the Application object relies on objects that are willing to provide data to services to do a couple of things. First, objects within your application that are willing to provide pasteboard data to Services must register the pasteboard types they are willing to send and receive (done via the registerServicesMenuSendTypes:andReturnTypes: method of the Application object). Typically, these will be objects that support selection by the user, and this will be done at start-up. Only services that accept and return these pasteboard types will appear on the Services menu.

Whenever the firstResponder changes in the key window, the Application object sends validRequestorForSendType:andReturnType: down the responder chain to see if a responder is willing to provide, and possibly receive, a given combination of pasteboard types. Based on this information, it will enable or disable the menu items in the Services menu. When the user chooses an item from the Services menu, the Application object sends -writeSelectionToPasteboard:types: down the responder chain, and the object should then write the selection out to the pasteboard. The Application object then uses Speaker-Listener to send a message to the servicesListener in the application that advertised the service, and the services Listener in turn sends a message to its services Delegate, passing the ID of the pasteboard containing the data. It is up to the servicesDelegate to perform whatever service was advertised.

Thus, to be a Services client you must:

1. Add a Services menu item to your main menu. The easiest way to do this is to use Interface Builder and just drag one in.

2. At start-up, send -registerServicesMenuSendTypes:andReturnTypes: to NXApp, specifying the pasteboard types you are willing to send and receive.

3. Implement the -validRequestorForSendType:andReturnType: for any object that is willing to write data to a Services pasteboard. Note this method takes arguments of type NXAtom. An NXAtom is simply a reference to a unique string, and thus NXAtoms may be compared directly. You use the NXUniqueString() function to create an NXAtom. Here is a simple example:

```
-validRequestorForSendType:(NXAtom) sendType
andReturnType:(NXAtom)returnType
{
NXAtom a;
a = NXUniqueString(NXFilenamePboard);
return (a==sendType)? self :nil;
}
```

4. Implement -writeSelectionToPasteboard:type:. NXApp will use this method to request your object to write its selection to the pasteboard when your object is the firstResponder and a Services menu item is chosen.

This object will also receive -readSelectionFromPasteboard: if it should replace its selection with data returned by the Services provider.

Note: The Text object has been modified so that it will perform the activities listed in items 2, 3, and 4 automatically, so you get Services "for free" whenever a Text object is the firstResponder in the key window, as long as you have added a Services menu item to your main menu.

To be a services provider you must:

1. Add a description of the services you wish to provide to your executable. (Note: You can tell my roots to advertise first, then implement!!!) See the Appkit release notes for details, but essentially this will require you to create a text file containing the necessary information and editing your ICONSECTIONS line in your Makefile to look like the following:

```
ICONSECTIONS =-sectcreate __ICON app /usr/
lib/nib/default_app_icon.tiff\ -sectcreate __ICON
__services /path_to_your_description_file
```

or create a file called makefile.preamble, add the following line, and include that file in your project directory:

```
LDFLAGS = -sectcreate __ICON __services /path_
to_your_description_file
```

2. Designate an object as the object to which the servicesListener should send any Services messages that come in via -setServicesDelegate:. Note that part of the description of the service is the name of the port (for example, Webster's) on which a listener will be listening. This listener, which I have referred to as the servicesListener, will typically be the default appListener for the application, but it can be another listener if you wish.

3. Implement the appropriate method or methods for your Services delegate. Once again, part of the description of the service is the partial name of the message to be invoked. Methods that respond to Services requests are always of the form -methodname:userDatA.error:, so you only need to provide the first part, or unique part, of the complete method name (such as methodname in the example just cited).

The exact details for all of the procedures just discussed, as well as for the many options available, can be found in the Appkit Release Notes. Once again, we strongly encourage you to take advantage of this new facility.

Bruce Blumberg *was the first employee hired at NeXT. He was involved in many fundamental design decisions regarding the NeXT machine and its software.*
Eric Larson *is a member of NeXT's customer support group.*

Product Showcase

Turn here every issue for the latest-breaking, most interesting products in the NeXT™ marketplace. This is an exciting time for NeXT users. Development is exploding. The NeXTstep environment is proving to be a spawning ground for unique products. These ads keep you abreast of the best of what's out there. Showcase ads provide you with concise, easy-to-use information. Every one includes a picture, product information, and a handy reader service number. All this in 1,075 words (picture = 1,000 words + 75 text.)

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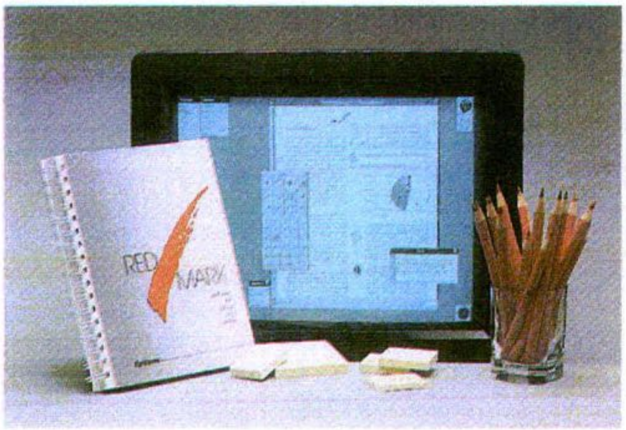

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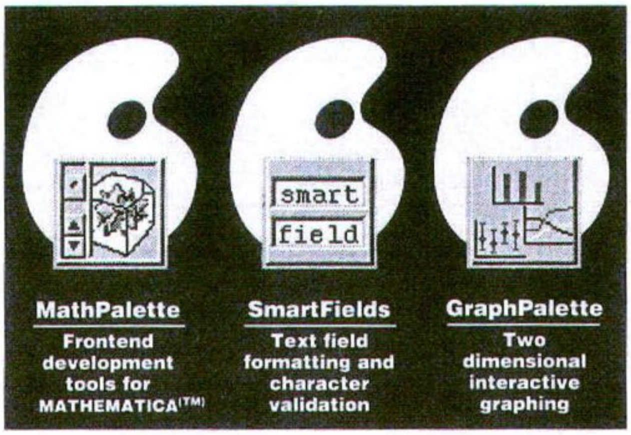
The Next Palettes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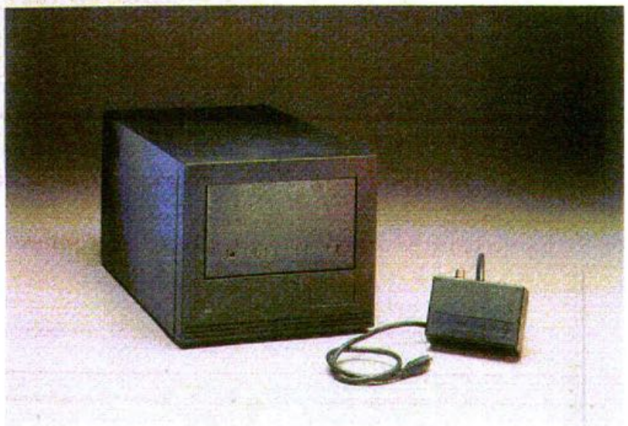

We are committed to providing high-quality, low-cost add-ons to the NeXT™ computer. All are fully guaranteed to work with your NeXT. Hard drives: Pre-formatted, pre-tested, plug-and-play Seagate Wren drives. Includes all cables, instructions, software, and unlimited 800# support. 660Meg $1995/$2195 1Gig $3295/$3495 (internal/external) Also: Inexpensive telecomm hardware to connect the NeXT to a phone line for voice mail, FAX, modem. Call for info.

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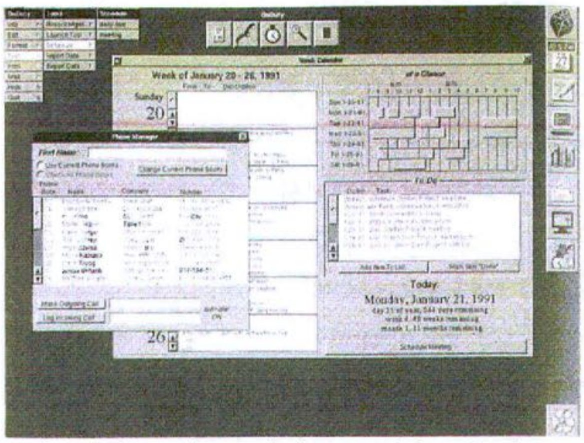

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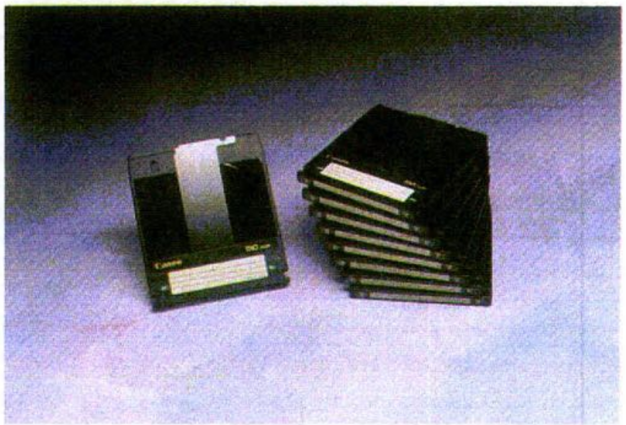

MicroNet offers you quality 512 MB dual-sided removable cartridges for NeXT rewritable optical systems. And that's not all we offer. MicroNet specializes in quality internal and external hard disk drives and tape backup for NeXT systems. Order your dual-sided cartridges and find out what's NeXT at MicroNet. Call today.

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Hardware and software for high-quality sound recording and data capture on NeXT™ computers. Two-channel 16-bit delta-sigma conversion, 64 times oversampling, self-calibration, mic preamp with phantom power, balanced and unbalanced inputs. 32, 44.1, and 48 KHz (plus external) sampling rates. Multi-A/D64x synchronization. Digital (AES/EBU) input and output. NeXT software for recording, control, and editing. Stand-alone operation – replacement DAT recorder front-end, etc. Now shipping. $1295.

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Fax (818) 792-0903

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Dock Soup

Dock Soup is a complete guide to third-party products available for the NeXT computer as of March 1991, according to the latest information available at press time.

The products reviewed in *NeXTWORLD* include the *NeXTWORLD* rating, as described below. Our reviews strive to answer the following three questions:

- What do products in this category attempt to do? This question frames the task the user needs to accomplish.
- What are the goals of this product according to its manufacturers, and how well does it accomplish those goals; that is, within its category, what specific problems does this product solve?
- Ideally, what might this product and category do? In other words, we judge the product also against an absolute concept of excellence rather than a relative one. In answering this question *NeXTWORLD* will serve as an advocate for change.

Our ratings are based almost entirely on the first two criteria. The third is used to suggest improvement and as a qualifier for our highest rating.

We avoid grade inflation. Very few products are awarded five cubes, and a good product gets three cubes, not four. Our reviews are independent, impartial, and fair. They reflect the combined judgment of the reviewer and the editorial staff. Unlike opinion pieces, bylined reviews are backed by, and are the responsibility of, the editorial staff.

For more information on any of the products listed here, call the manufacturer.

The NeXTWORLD rating system

■■■■■ **Best of Breed.** Solves a user's problem in innovative ways. Meets the highest goals for the category.
■■■■ **Excellent.** Very good by today's standards, but we can envision better.
■■■ **Good.** Has some problems, but solves others.
■■ **Fair.** Merely adequate. Has some bugs.
■ **Poor.** We don't recommend it.

Business

Boss Document Management System

This system addresses five major problems of work flow and document management on a network (what's going on, security, storage and retrieval, revision and configuration control, and notification) while preventing lost information and inconsistent revisions.
$999 for single user, network prices vary. Boss Logic, 607 W. Broadway, Fairfield, IA 52556. 515/472-7740, 515/472-7787 fax

Calendoscope

An appointment calendar program for individuals or organizations. Appointments are listed by day, week, month, or year. Agendas and notes can be attached as documents. Appointment notification options include sound, pop-up windows, and e-mail.
$95. Stained Glass Software, 1173 Kent Ave., Sunnyvale, CA 94087. 408/249-3337

Lotus Improv 1.0

■■■■ (beta)

With a revolutionary model custom-made for data analysis, Improv is an essential spreadsheet for anyone doing financial modeling. Its first release, however, lacks such basic important features as an undo command and a macro language.
$695. Lotus Development Corporation, 55 Cambridge Pkwy., Cambridge, MA 02142. 617/577-8500

OMEN III

A stock-quotation system incorporating client management, technical analysis, real-time news retrieval, and on-line order entry functions. Live connections to spreadsheets and analytical programs update linked charts, reports, and tickers. Provides voice and visual alerts when any security, currency, commodity, or index limits are reached.
For price, contact Microstat Development Corporation. Microstat Development Corporation, 2150 Western Pkwy., Vancouver, BC V6T 1V6, Canada. 604/228-1612, 604/228-9793 fax

On Duty

A package of utilities for daily office tasks. Includes a phone directory; calendar and appointment book; scientific, office, date, and programming calculators; utilities for finding and comparing files; and windows for displaying the keyboard and ASCII character sets, launching applications, and indexing files.
$295. Digital Instrumentation Technology, 901 18th St., #11000, Los Alamos, NM 87544. 505/662-1459, 505/662-0099 fax

PaperSight Light

A digital file cabinet that can be used on a stand-alone system or integrated network. Accepts and refiles documents from a variety of input sources. Text and voice annotations and markup overlays can be added.
$695. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/488-3600, 412/687-7065 fax

PowerStep

■■ (beta)

A capable spreadsheet, equipped with most of the power features pioneered by leading PC and Mac spreadsheets, marred by an Interface-Builder-gone-wild design.
Price to be announced. Ashton-Tate Corporation, 21010 Hamilton Ave., Torrance, CA 90509. 800/437-4329, ext. 3717

TransManager 1.0

A transportation terminal management system for terminal operators, ocean and rail carriers, and port authorities. Provides graphic tools for managing cargo, equipment, and other functions. Can be used as a graphical front end to other existing automated systems that support terminal operations.
For price, contact TransGraphics Systems. TransGraphics Systems, 3730 Mt. Diablo Blvd. #315, Lafayette, CA 94549. 415/283-5750, 415/283-5752 fax

Who's Calling? 1.0

A client-management system that imitates many routine office functions by combining relational database technology with simple file interfaces. Voice messages remind users to make phone calls and to announce appointments, while a message board sends text, voice, and images to others on a network.
$495. Adamation, 1435 Center St., Oakland, CA 94607. 415/452-5252.

Wingz 1.1

■■■

A powerful, English-like programming language and stunning 3D graphics put this spreadsheet out front for users who care about those things. However, rudimentary file links and 2D files that make modeling difficult, and a clunky interface, make this a less than stellar entry.
$699. Informix Software, 16011 College Blvd. Lenexa, KS 66219. 913/599-7100, 913/599-7350 fax

Connectivity/ Communications

AFS 3.1

A distributed file system for networks linking up to thousands of computers. Offers common file space for all users regardless of location. Equipped with a window for monitoring file server status, an on-line backup system, and various security features.
Starts at $7000, discount for educational institutions. Transarc Corporation, The Gulf Tower, 707 Grant St., Pittsburgh, PA 15219. 412/338-4400, 412/338-4404 fax

Communicae

Software that enables NeXT computers to communicate with DEC and IBM mainframes and minicomputers and other information services. Permits communication with many graphics and CAD mainframe and minicomputer applications.
$395. Active Ingredients, 222 Third St. #0234, Cambridge, MA 02142. 617/576-2000, 617/576-3609 fax

GatorBox

◆ ◆ ◆

A gateway for linking TCP/IP networks (like the NeXT's) to AppleTalk or EtherTalk networks. The system is expensive and almost impossible to set up without extensive help from technical support. But once connected, however, it performs reliably. The GatorShare software is the key to its utility, mounting NeXT volumes into the Macintosh filing system, enabling easy file transfer between platforms.
$2795 for basic configuration, $595 for GatorPrint, $1995 for GatorShare (includes GatorPrint), $995 for GatorMail (for ten users), $4990 for full deluxe configuration and extended warranty. Cayman Systems, 26 Landsdowne Street, Cambridge, MA 02139. 617/494-1999

GatorMail

A bridge between QuickMail or Microsoft Mail and any UNIX mail systems on SMTP networks, including Internet. Features mail exchange, aliasing, and data enclosures.
$995 (10-user package). Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999, 617/494-9270 fax

MacLinkPlus/PC

A kit containing more than 100 translators that transfer and translate files between the NeXT and Macintosh environments. Some of these translators provide a databridge between WriteNow for NeXT and many Macintosh word processors (such as MacWrite, Microsoft Word, WordPerfect, and WriteNow). Also transfers and translates data from DOS files accessed through the Macintosh desktop.
$199. DataViz, 35 Corporate Dr., Trumbull, CT 06611. 203/268-0030, 203/268-4345 fax

MicroPhone II

A protocol script engine that automates users' communications. Provides custom front ends for e-mail and on-line research and data exchange, and Watch Me, an automatic script recorder that records for later replay.
For price, contact Software Ventures Corporation. Software Ventures Corporation, 2907 Claremont Ave. #220, Berkeley, CA 94705 415/644-3232, 415/848-0885 fax

NeXTmail 2.0

NeXT's mail system, bundled with every NeXT machine, takes advantage of the machines' DSP to add a new layer—voice annotation—to current e-mail standards. Although some features are less than intuitive, the sytem works effectively to make multimedia communication almost effortless.
Free with NeXTstep 2.0
NeXT Computer, 900 Chesapeake Drive, Redwood City, CA 94063. 800/848-NEXT

SoftPC

◆ ◆ ◆ ◆ (beta)

A remarkably reliable, fast, and ingenious emulator that enables NeXT machines to run DOS PC software.
$599. Insignia Solutions, 254 San Geronimo Way, Sunnyvale, CA 94086. 408/522-7600

3270Vision

◆ ◆ ◆ ◆

A powerful 3270 terminal emulator that allows IBM mainframe connectivity from the NeXTstep environment. 3270Coax is an adaptor box that connects the NeXT's SCSI port to an IBM 3174 or 3274 controller.
$695 for 3270Vision, $2295 for 3270Coax. Conextions, 79 Wildwood Rd. #200, Andover, MA 01810. 508/475-5411

Worldtalk/400

An enterprise-wide messaging system that interconnects many existing messaging applications for computers with UNIX, OS/2, Netware, MS-DOS, and Macintosh operating systems. Compatible with other vendors' X.400-based messaging products and with European messaging standards.
$5000 for Worldtalk/400 core; $3000 for Worldtalk/400 Gateway Engine. Touch Communications, 250 E. Hacienda Ave., Campbell, CA 95008. 408/374-2500, 408/374-1680 fax

Databases

GatorShare

Software that resides in the GatorBox allowing file and data sharing between Macintosh and NeXT computers, transforming the NeXT computer into a non-dedicated file server for the Macintosh.
$1995. Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999, 617/494-9270 fax

INGRES Relational Database Management System

An application development environment providing 4GL, SQL, and visual programming methods. Created applications are instantly portable across multiple hardware platforms.
Price varies. Ingres Corporation, 1080 Marina Village Pkwy., Alameda, CA 94501. 415/769-1400, 800/4INGRES, 415/748-2545 fax

MediaStation 1.2

A database for multimedia data acquisition and processing. Features include high-resolution image scanning, CD-quality audio recording, text processing, and frame-by-frame animation.
$2500. Imagine, 32 N. Washington #14, Ypsilanti, MI 48197. 313/487-7117, 313/487-1323 fax

Objective DB Toolkit

An object library that bridges the gap between the Sybase database engine and developer applications. Provides extensive templating for TextFields and mapping of palette objects to database data types. Accommodates text, image, and sound data and supports text, buttons, and slider arrays.
$995. Professional Software, 599 North Ave., Wakefield, MA 01880. 617/246-2425, 617/246-2443 fax

ORACLE Relational Database Management System

An RDBMS that simplifies application development and operation by implementing fourth-generation capabilities. Runs on more than 80 different computer platforms. Oracle applications and data move easily from one platform to another without modification.
For price, contact Oracle Corporation. Oracle Corporation, 20 Davis Dr., Belmont, CA 94002. 800/345-3267

SYBASE SQL Server

Server software based on Sybase's SQL RDBMS. Features include client-server architecture to separate front-end and back-end functions, distributed data management, and the DB-Library SQL Server Interface to connect applications with the SQL Server.
For price, contact Sybase. Sybase, 6475 Christie Ave., Emeryville, CA 94608. 415/596-3500, 800/879-2273, 415/596-4508 fax

Developer's Tools

Absoft Object-Oriented FORTRAN 77 (v. 2.1)

A full implementation of the ANSI X3.9-1978 and MIL-STD 1753 FORTRAN language definitions designed for scientific and engineering users who want to port and develop programs from mainframe, mini, and workstation environments.
$995; academic price $750. Absoft Corporation, 2781 Bond St., Rochester Hills, MI 48309. 313/853-0050, 313/853-0108 fax

ACUCOBOL-85

System software that produces machine-independent object code. Offers a multiple-version source control system, a split-screen interactive source code debugger for viewing, and interlanguage communication flexibility. Supports most features of Data General ICOBOL.
$2995. Acucobol, 7950 Silverton Ave. #201, San Diego, CA 92126. 619/271-7097, 619/566-3071 fax

Allegro CL

A full-featured Lisp programming environment that is compatible with Objective-C, Interface Builder, and the Application Kit. A foreign function interface allows programmers to call FORTRAN and C routines. Also offers debugging options and generation-scavenging garbage collection.
For price, contact Franz. Franz, 1995 University Ave., Berkeley, CA 94704. 415/548-3600

BugByte 1.0

A symbolic debugger for C and Objective-C programs. Provides a visual indication of the program counter, point-and-click setting of break points and display of variable contents. Examines program memory, variables, registers, signals, and stack frames.
$295; academic price $195. ONyX Systems, 2325 Clareton Dr., Arlington, TX 76018. 817/468-2695

Displaytalk 1.0

An integrated development environment for Display PostScript programming. Useful for creating and testing pswraps during program development, and for

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designing and developing full-screen PostScript animation.
$995. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 415/961-4400, 415/961-3769 fax

Flexible License Manager v. 2.0

A network-wide, multiaccess package that allows software to be licensed on a concurrent-usage basis. Features include software that runs on any network node, enforced software expiration dates, demonstration software that can be licensed over the phone, and a log file that records all license transactions.
$12,000 one-time binary license fee. Highland Software, 940 E. Meadow Dr., Palo Alto, CA 94303. 415/493-8567, 415/493-4506 fax

Macro Cross Assembler

A program that translates one or more source fields containing DSP instruction mnemonics, operands, and assembler directives into object modules that are relocated and linked by the DSP96000 Linker. Features functions for data conversion, error checking, and transcendental math.
For price, contact Motorola. Motorola, Digital Signal Processors, MD: 0E314, 6501 William Cannon Dr., West Austin, TX 78735. 512/891-2030, 512/891-2947 fax

Modula 2

A compiler that supports UNIX, Mach, and NeXT functions, as well as a set of standard libraries. Provides source code for the libraries and support for IEEE floating-point processing. Also allows the addition and modification of functions.
$495. Jefferson Software, 20826 N. 16th Ave., Phoenix, AZ 85027. 602/869-0316

NeuExpert

A knowledge representation tool that combines expert system and neural network capabilities. Supports statistical rule analysis, uncertainty, graphic knowledge representations, backward chaining, and system learning. Limited object-oriented knowledge structures can be defined by the user.
$25,000. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628-DISK, 415/948-6296 fax

NextBus Development Kit

Hardware and documentation for designing a NextBus board. Includes documentation for the NextBus and the NextBus Interface Chip (NBIC), preliminary information on writing loadable kernel drivers, two NBIC chips, a prototype board, and a disk containing related software tools and examples.
$350. NeXT Computer, 900 Chesapeake Dr., Redwood City, CA 94063. 800/848-6398, 415/780-2801 fax

[OT Palettes: 1.0]

A family of custom object palettes for use with the Interface Builder application. Each palette combines objects of similar form and function, such as SmartFields, Chooser, and Math.
Prices vary according to object. Objective Technologies, 7 Dey St. #711, New York, NY 10007. 212/227-6767

Oasys Compiler Family

A group of language compilers based on the Green Hills integrated family of compilers (C, FORTRAN, and Pascal). All the languages are inter-language callable. Offers procedural inlining, register caching, common sub-expression elimination, strength reduction, and loop unrolling. Provides full 68881, 68882, and IEEE floating-point support.
$1500 per language. Oasys, 230 Second Ave., Waltham, MA 02154. 617/890-7889, 617/890-4644 fax

PaperSight Developer's Toolkit

More than 70 code and data modules to aid the VAR or turnkey developer in image management. Includes modules for scanning, fax input and output, image compression and decompression, image transformation and character recognition, text and voice annotation, annotation-based indexing, and voice help.
$40,000. Visual Understanding Systems, 4300 Forbes Ave., Pittsburgh, PA 15213. 412/488-3600, 412/687-7065 fax

Simulator Programs

Two software programs to aid in the development of programs and algorithms running on the Motorola DSP56000 and DSP96000. The SIM56000 program emulates all of the functions of the DSP56000/1. The SIM96000 provides identical functions for the DSP96000 family.
For price, contact Motorola. Motorola, Digital Signal Processors, MD: 0E314, 6501 William Cannon Dr., West Austin, TX 78735. 512/891-2030, 512/891-2947 fax

UNIX MUMPS v. 3.1

A computer database and programming language specially suited for the interactive manipulation and storage of large volumes of medical and business data. Unlike conventional MUMPS (Massachusetts General Hospital Utility Multi-Programming System) implementations, UNIX MUMPS can be integrated into the UNIX environment and supports transparent, distributed, and heterogeneous networks.
$595 for single user; $5500 for multi-user (one to four seats). Toltec Human Services, 5005 N. Pennsylvania Ave. #301, Oklahoma City, OK 73112. 405/840-4254, 405/840-3041 fax

Graphics

Adobe Illustrator

A graphic design and illustration program that uses Display PostScript, and includes freehand, auto trace, geometric shapes, pen, and blend tools. Compatible with versions of Adobe Illustrator on other computer systems.
$595. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 800/344-8335, 415/961-3769 fax

ClickArt for NeXT

A collection of nearly 400 illustrations in EPS format. The Business Art segment includes images of office equipment and symbols for occupations, communications, and transportation. Other illustrations show people, animals, maps, sports, and food.
$295. T/Maker, 1390 Villa St., Mountain View, CA 94041. 415/962-0195

Create!

■ ■ ■ ■ (beta)

A full-featured Color PostScript drawing and paint environment for manipulating and adding special effects to graphic objects and text.
$495; low-cost upgrade for TextArt owners. Stone Design Corporation, 2425 Teodoro N.W., Albuquerque, NM 87107. 505/345-4800

Diagram!

■ ■ ■ ■ (beta)

A "digital whiteboard" that creates everything from organizational charts to annotated illustrations.
$399. Lighthouse Design, 6516 Western Ave., Chevy Chase, MD 20815-3212. 301/907-4621, 800/366-2279

TopDraw v. 1.0

An object-oriented drawing package that integrates graphics, text, and raster images. Accepts EPS, MIF, TIFF, and RTF formats. Drawing objects include a spectrum of geometric shapes, with many object-fill properties. Text can be edited after applying graphic manipulations. Also features user-definable color palettes and spot color separations.
$595. Media Logic, 2501 Colorado Ave. #350, Santa Monica, CA 90404. 213/453-7744, 213/453-9695 fax

Groupware

Professional PaperSight

An image-management program for scanning, viewing, organizing, filing, searching, and archiving documents, and sending and receiving faxes. Overlays can be used for multiple layers of corrections, annotations, and written or recorded messages. Optional intelligent character recognition available.
$1695; $1795 for character recognition. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/687-3800, 412/687-7065 fax

Redmark

A paperless review program that allows multiple reviewers to proof and critique documents by marking up a transparent overlay on the original. Annotation options include standard proofreading symbols, drawing tools, text, voice recordings, and imported graphics.
$285. Epitome, 716 Summit Lake Ct. #100, Knoxville, TN 37922. 615/675-0910,615/966-2258 fax

Peripherals

Abaton Scan 300/GS

An 8-bit flatbed scanner that scans at resolutions of up to 300 dots per inch for line art, halftones, and 256 levels of grayscale. Saves files in TIFF format and will print to NeXT, Macintosh, IBM PC, and PS/2 computers.
$1598 for 300 GS engine; $595 for interface kit. Abaton, 48431 Milmont Dr., Fremont, CA 94538. 800/444-5321, 415/683-2870 fax

A/D64x

An analog/digital interface for high-quality sound recording and data capture. Offers two channels of 16-bit, delta-sigma conversion, a microphone preamp with phantom power, and independent digital AES/EBU input and output.
$1295. Singular Solutions, 959 E. Colorado Blvd., Pasadena, CA 91106. 818/792-9567, 818/792-0903 fax

Ariel QuintProcessor

A signal- and array-processing system that uses five digital signal processors to enhance the speed and versatility of the NeXT Music Kit. Can be used for array processing, music synthesis, speech recognition, and digital audio recording and mixing.
$6995. Ariel Corporation, 433 River Rd., Highland Park, NJ 08904. 201/249-2900, 201/249-2123 fax

Cube Digital I/O

A NeXTbus circuit card that furnishes 64 channels of digital I/O, a Centronics-compatible parallel port, and a breadboarding area for developing specialized electronic circuitry. The card has 32 bits each of input and output, and connects users' systems to a wide variety of printers and plotters, including standard IBM PC printers. AC and DC input and output modules available for direct connection.
$745 Digital Instrumentation Technology, 901 18th St. #11000, Los Alamos, NM 87544. 505662-1459, 505/662-0099 fax.

Cube Floppy 2.9

An external SCSI 3.5-inch floppy disk drive that reads and writes to 3.5-inch disks used by computers with MS-DOS, Macintosh, and UNIX operating systems.
$250 for floppy works; $520 for Cube floppy; $680 for package with software. Digital Instrumentation Technology, 901 18th St. #11000, Los Alamos, NM 87544. 505/662-1459, 505/662-0099 fax

DaynaFILE

An external floppy disk drive that enables NeXT computers to read and write to 5.25-inch, 1.2MB disks and 3.5-inch, 1.44MB disks. The DaynaDOS file transfer application permits NeXT, DOS, and Macintosh files to cohabit inside the NeXT file system and be opened and edited using various compatible NeXT applications.
Starts at $750. Dayna Communications, 50 S. Main St. Fifth Floor, Salt Lake City, UT 84144. 801/531-0600

Digital Ears

A hardware/software package for entering, recording, and manipulating CD-quality sound and high-resolution laboratory data. Can be used for computer-based training, education, presentations, digital audio recording, voice therapy and diagnosis, speech and voice recognition, and acoustic research.
$795. Metaresearch, 516 S.E. Morrison, Ste. M-1, Portland, OR 97214. 503/238-5728, 503/230-2627 fax

Digital Eye

A hardware/software package for entering and recording still and moving NTSC video images from many sources, including laserdisc players, video and still-video cameras, and VCRs. Features variable image size and resolution selections and software controls for image enhancement.
$975. Metaresearch, 516 S.E. Morrison, Ste. M-1, Portland, OR 97214. 503/238-5728, 503/230-2627 fax

DM-N Ariel Digital Microphone

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Hardware and software that supplies analog-to-digital conversion for high-quality, high-frequency sound processing. The microphone provides great quality sound input, but its ergonomics and the accompanying software and documentation got very little attention.
$595. Ariel Corporation, 433 River Road, Highland Park, NJ 08904. 201-249-2900

Epoch-1 InfiniteStorage Server

An application- and platform-independent network server that communicates with heterogeneous computer networks. Equipped with fast magnetic disks that serve as a virtual cache while data is "staged" on and off to optical disk. Performs automatic, unattended on-line and remote system backup across a network.
$82,900 to $694,000. Epoch Systems, 8 Technology Dr., Westborough, MA 01581. 508/836-4711, 800/US-EPOCH, 508/836-3802 fax

Extron Board

A board that allows NeXT computers to display video on a variety of compatible, large-screen data projectors or monitors.
$2500. Extron Electronics, 13554 Larwin Cir., Santa Fe Springs, CA 90670. 213/802-8804, 800/633-9876, 213/802-2741 fax

Extron RGB 111

A computer-to-monitor interface that provides simultaneous local monitor viewing and an equally clear display on a compatible monitor or projector.
$370. Extron Electronics,13554 Larwin Cir., Santa Fe Springs, CA 90670. 213/802-8804, 800/633-9876, 213/802-2741 fax

IX-30F Image Scanner

An 8-bit flatbed scanner with a scanning resolution of up to 300 dots per inch and 4, 16, or 256 levels of grayscale. Saves images in EPS or TIFF formats with compression options. Has an automatic document feeder (ADF) option for OCR applications.
$1545; $595 for ADF. Canon U.S.A., One Canon Plaza, Lake Success, NY 11042. 800/848-4123

JETSTREAM Tape Backup System

A backup program that uses standard 8mm removable and rewritable videotape cartridges. Archives up to 2.3 gigabytes of data per tape at speeds up to 14.4MB per minute. Error correction code ensures data integrity.
$5995. Personal Computer Peripherals Corporation, 4710 Eisenhower Blvd., Bldg. A4, Tampa, FL 33634. 813/884-3092

LaSTLock

A hardware security system for the NeXTcube. Protects the monitor, keyboard, mouse, and Cube from tampering and theft. Attaches to a NeXTcube without bolts, screws, or glue.
$195. Prevail, 3490 The Alameda, Santa Clara, CA 95050. 408/296-6550

OcéColor

A color thermal transfer printer capable of monochrome, 3-color, and 4-color printing using a wax-based ink ribbon. Outputs at 300 x 300 dots per inch. Comes with Pantone color simulations and 5MB RAM.
$8990. OcéGraphics, 385 Ravendale Dr., P.O. Box 7169, Mountain View, CA 94039. 415/964-7900, 800/545-5445, 415/961-6152 fax

PLI SuperFloppy 2.8

A floppy disk drive that uses vertical recording to increase the capacity available in most disk drives from 1.44MB to 2.88MB. Compatible with 720KB and 1.44MB disk standards, allowing users to work with files from MS-DOS, OS/2, or UNIX-based systems.
$499. Peripheral Land, 47421 Bayside Pkwy., Fremont, CA 94538. 415/657-2211, 800/288-8754, 415/683-9713 fax

PM1.44

An external 3.5-inch SCSI floppy disk drive that reads compatible file formats from IBM, DOS, and Macintosh computers. Can be stacked on top of the Cube.
$849. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628-DISK, 415/948-6296 fax

PMHDE

An external SCSI hard disk drive enclosure that accommodates 3.5-inch or 5.25-inch hard disks. Provides additional external disk storage of up to 7 gigabytes. Can be stacked on top of the Cube or mounted in a rack.
$695. Pacific Microelectronics, 201 San Antonio Cir., Ste. C250, Mountain View, CA 94040. 415/948-6200, 800/628- DISK, 415/948-6296 fax

Scan-X Color

A flatbed scanner that scans at resolutions of up to 2400 dots per inch for line art and 400 dots per inch for color and grayscale images. Supports TIFF and EPS formats and the NeXT pasteboard.
For price, contact HSD U.S. HSD U.S., 1350 Pear Ave., Ste. C, Mountain View, CA 94043. 415/964-1400, 415/964-1538 fax

Scan-X Professional

An 8-bit scanner that scans at resolutions of up to 1500 dots per inch for line art and 300 dots per inch for grayscale images. Saves in TIFF and EPS formats, recognizes 256 levels of grayscale, and scans legal-size documents. Optional 50-page sheet feeder and OCR software available.
$2195. HSD U.S., 1350 Pear Ave., Ste. C, Mountain View, CA 94043. 415/964-1400, 415/964-1538 fax

SCSI488/N

An IEEE 488 interface plus a software driver that gives the NeXT computer control of up to 14 IEEE instruments. Uses familiar Hewlett-Packard–style IEEE commands while providing transfer rates as high as 900KB per second. Attaches to the SCSI port, leaving an expansion slot open.
$1495. IOtech, 25971 Cannon Rd., Cleveland, OH 44146. 216/439-4091, 216/439-4093 fax

VISUS Digital Document Scanners

The Personal Page Scanner (with optional autofeeder) scans any document up to legal size. For high-volume workload and larger documents, the Departmental Scanner (11 x 17 inches) and the Large Format Scanner (24 x 60 inches) scan at resolutions up to 400 dots per inch. The Industrial Scanner scans at resolutions up to 2000 dots per inch with an absolute gauging accuracy of .002 inch over a distance of 24 inches.
$1395 for Personal Page Scanner; $2295 for autofeed; $17,995 for Departmental Scanner. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/488-3600, 412/687-7065 fax

VISUS Fax Modems

A pocket-size, battery-powered, Group III device that sends, receives, and automatically files faxes. Designed for high-volume applications and supports Professional PaperSight workgroups over a NeXT network.
$995. Visual Understanding Systems, 3400 Forbes Ave., Pittsburgh, PA 15213. 412/488-3600, 412/687-7065 fax

Scientific

DAN, The Data ANalyzer 1.0

An engineering and scientific data analysis system. Capabilities range from input and output of several data file formats to table generation, mathematical manipulation of data tables in memory, and complete X-Y coordinate-plotting support. Any number of overlaid plots are available with distinguishing styles, plot symbols, and grayscales.
$795. Triakis, 560 Bryce Ave., Los Alamos, NM 87544. 505/672-3180

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An effective aid for anyone studying group theory, abstract algebra, or the mathematical methods of physics and chemistry. Contains all finite groups up to and including order 20 and can compute the group table, orders and inverses of all the elements, center of the group, commutator subgroup, conjugacy classes, and all subgroups and normal subgroups and their left and right cosets and quotient group.

$20; $80 for site license. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Mathematica

An application for both interactive calculation and high-level programming. Performs almost any numerical, symbolic, or graphical mathematical manipulation. Displays 2D and 3D plots of functions and data and 3D object modeling.

For price, contact Wolfram Research. Wolfram Research, 100 Trade Center Dr., Champaign, IL 61820. 217/398-0700

Math++ 2.0

A C-language math library of 100 functions designed to support numerical analysis in applications. Includes over 1.5MB of source code and a 470-page user's guide with numerous program examples.

$295. Triakis, 560 Bryce Ave., Los Alamos, NM 87544. 505/672-3180

Rubik Algebra

An application that uses the Rubik's cube as a tool for illustrating, generating, and exploring a variety of ideas and basic theorems from elementary group theory. Can decompose an arbitrary sequence of face rotations into disjoint cycles, in order to illustrate the order of an element in a finite group, the effect of conjugation on cycle structure, and even and odd permutations.

$20; $80 for site license. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Spring

A program for exploring the second-order differential equation that models the motion of a mass on a spring. Features graphs and real-time animations of the solution and the parts of the solution. Useful for teaching and studying university-level mathematics.

$20. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Taylor

An interface to Mathematica that allows users to investigate Taylor polynomials. Users specify the function to be approximated, the degree of the Taylor polynomial desired, and the center point of the expansion. Taylor then graphs the function and its approximating polynomial on the same axes.

$20; site license $80. Halchin and Fleming, 2122 Reynolds Dr., Charleston, IL 61920. 217/348-0917

Text Processing/DTP

Adobe Plus Pack

A collection of 26 additional fonts to supplement the 13 standard fonts on NeXT computers. Typefaces include Palatino, ITC Bookman, ITC Zaph Chancery, ITC Zaph Dingbats, ITC Avant Garde Gothic, ITC New Century Schoolbook, and Helvetica Narrow and Condensed.

$495. Adobe Systems, 1585 Charleston Rd., Mountain View, CA 94039. 800/344-8335, 415/961-3769 fax

FrameMaker 2.0

A publishing environment that integrates word processing, graphics, page layout, equation-editing, and book-building tools.

$995; academic price $495. Frame Technology Corporation, 1010 Rincon Cir., San Jose, CA 95131. 408/433-3311, 408/433-1928 fax

TextArt 1.0

A combination drawing package and PostScript generation tool that skews text, places it in a straight line, around a circle, or in an arc or rose, and adds shadows. Controls letter placement with track, sector, and pair kerning. Basic drawing functions combine images with geometric shapes and EPS or TIFF graphics.

$375. Stone Design Corporation, 2425 Teodoro N.W., Albuquerque, NM 87107. 505/345-4800, 505/345-3424 fax

The Font Company Type Library

A library of more than 1500 PostScript Type 1 typefaces. Buyers can purchase any number of fonts.

Price varies with the number of typefaces purchased. The Font Company, 12629 N. Tatum Blvd. # 210, Phoenix, AZ 85032. 602/998-9711, 800/442-FONT, 602/998-7964 fax

TouchType

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"Accessory software" for creating and controlling display type for book covers, titles, logos, and other projects. Simple to use and powerful.

$249. RightBrain Software, 20 Medway Rd., Woodside, CA 94062. 800/472-7246

WordPerfect

A word processor featuring columns, macros, merge, table of contents, indexing, spell checking, a thesaurus, footnotes and endnotes generation, graphics manipulation, and an automatic timed backup system.

$495. WordPerfect Corporation, 1555 N. Technology Way, Orem, UT 84057. 801/225-5000

Vertical Market

VTLS InfoStation 1.0

A hypermedia information-access system for library automation. Provides on-line catalog search and retrieval of audio, textual, and graphic data. The audio-visual help system gives users digitized voice instructions, line drawings, and text explaining how to use the program.

$995; contact VTLS for network prices. VTLS, Virginia Tech Corporate Research Center, 1800 Kraft Dr. #200, Blacksburg, VA 24060. 703/231-3605, 703/231-3648 fax

TranScriber 1.0

A record transcription tool for physicians and medical transcriptionists. Runs on local or remote workstations. Finished reports may be stored in either WriteNow or ASCII text formats.

$395. Toltec Human Services, 5005 N. Pennsylvania Ave. #301, Oklahoma City, OK 73112. 405/840-4254, 405/840-3041 fax

Other Products

The First Compilation Disk

A collection of 400MB of the most popular software publicly available for NeXT computers. Includes utilities, programming languages, games, and information files. Also comes with one year of NeXT-specific Usenet network news and hundreds of old-fashioned UNIX programs.

$249. Lighthouse Design, 6516 Western Ave., Chevy Chase, MD 20815-3212. 301/907-4621, 800/366-2279

TheLibrary

An on-line information system for application developers and information publishers designed to work like the public library, "books" are found through a card catalog and located on "bookshelves." Features interactive on-line versions of books.

For price, contact We Design. We Design, 4286 Redwood Hwy. #237, San Rafael, CA 94903. 415/479-1105, 415/449-0967 fax.

Classified

NeXTWORLD magazine Classifieds is a bimonthly feature. Rates effective January/February Issue, 1991. Per-line rates $40.00. Thirty -six characters equal one line (count each letter, space and punctuation mark as a character). Four-line minimum, seven lines per inch. For column inch rates, please call or write for complete rate card information. Check or money order (or certified check) must accompany copy and be received six days prior to close date. All ads accepted at the discretion of the publisher. *NeXTWORLD* magazine 501 Second St., San Francisco, CA 94107 415/978-3182.

USER GROUPS

BANG

The NeXT™ experience is meant to be shared. Connect yourself to the NeXT community through the Bay Area NeXT-user Group. For more information, contact BANG at: bang_request@meta-x.stanford.edu or P.O. Box 8858, Stanford, CA 94309 or fax 415/ 957-0512.

DESIGN SERVICES

Eye-catching icons and logos at affordable prices. In need of icons or logos for your NeXT™ application? Call Knox Design. In addition to designing icons and logos for top-selling software products, Knox has also produced a clip art library containing over 400 illustrations. Our diverse styles will give any software application a crisp professional look and feel while conveying their intended message. Knox Design, 300 Broadway, #29, San Francisco, CA 94133 415/ 398-0136.

CONSULTING SERVICES

Software consulting. We have extensive experience working for the biggest names in the industry. For top-notch talent you can count on, contact EmSquare Engineering, Inc. 14132 177th Avenue NE, Redmond, WA 98052. 206/882-2087

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Continued from page 80

tory he wants to negate, the interpersonal encounters she longs to have. Virtual worlds, indeed, that bear little resemblance to the simulation on our screens.

The roots of virtual reality technology can be found in CAD/CAM applications and in early flight simulation programs developed by the military. Applications appearing now are being targeted at such widely ranging fields as architecture, medicine, ecology, and telerobotics. It's no accident that Autocad, creator of one of the most widely used CAD programs, is involved in this research. It's also no accident that Virtus Walkthrough, a real-time virtual reality technology, uses as its metaphor an architectural model that lets you appear to walk around in familiar 3D space. What makes it exciting is that your movements are displayed nearly instantaneously, without requiring time for the screen to redraw. What makes it dull is that the constructions are quite primitive.

But reality stops at the simulated door. Of late, the visions for virtual reality include creating alternate worlds that you can physically enter. At this extreme edge, virtual reality would precipitate an ultimate encounter between human and computer, one that allows a person to experience and manipulate a synthetic world that feels just like the real world. The high-fashion garments sported in this world are nerdy, tight-fitting computer clothes, and instead of looking at a screen, you wear clumsy goggles that widen your vision, and suits with sensors that communicate sensations. You look a little like a space invader, but the space you enter is cyberspace, and the laws of real space do not apply.

In 1991, however, our technology still can't keep up with your imagination, and virtual reality is more hyperbole and promise than substance. As amazing as the Virtus product is, it offers only a shell of a self to try on—just a "presence" in the landscape—a bit of digital skin wrapped around empty space. Very crude skin. You can get into this skin, but really, your own skin is much more interesting. So what's all the fuss?

The secret of virtual reality is really quite simple. *It's what it's not*—yet—that interests people.

The digital self. The state of the art, at the site of the desktop, is crude, as I've said, but our dreams for it are not. What you may have read about virtual reality amounts to a fantasy world gone wild. So much for modeling alternate environments. Our fascination really derives from imagining *ourselves* in it, but changed, freer, more exotic. Virtual reality is a kind of metaphysical divining rod. We wave it over our psyches to pinpoint and tap an archetypal wellspring in our soul, so that it rises up and uproots our old image of ourselves. It's better than films or literature, or so it seems, because we're not *outsiders* who passively observe these fantasy worlds. We're *participants*. We make it happen. And it's not another world that really interests us, but another *self*.

Whereas up until now we have used the computer to model the myriad tasks of our intellect, from financial analysis to chess moves, we're now fascinated by the prospect of modeling the *psyche*. It's the digital progeny of 20 years of escalating self-absorption. A generation of clinical self-scrutiny, in which we've labeled the self just as surely as if we'd stamped it with a bar code, has resulted in a self that evaporates behind our eyes, lost in a welter of demographics, zip codes, acronyms, self-help movements, and brand names. Absorption with the self has led to the self's being absorbed in a model of the self. Preoccupation with the self has led to ennui with the self and a desire to mold the self as if it were plastic, or *bits* and *bytes*, and short of that, to abandon the known self in a virtual world, to become the other selves that we've yearned to become.

The sad fact is that we haven't been satisfied with partial measures, such as dying our hair, injecting silicone into our lips and breasts, searching for who we are through psychoanalysis, vacations, meditation, drugs, and falling in love. We want to remove ourselves to a faraway country, where we can remake that elusive self any way we like. In this virtual reality of our minds, we abandon the quest for self-knowledge and opt instead for a tour of a theater of the self.

From this perspective, computer technology plays a key role in reshaping this shape-shifting self. Think about how much of our preoccupation with computer technology involves making connections with others: proliferating local and global networks, managing workgroups, exchanging information, resigning ourselves to promiscuous communications practices and the omnipresence of communication devices. In the world of Jaron Lanier (founder and CEO of VPL, a firm that has developed eye phones and data gloves for virtual reality systems), reality is built for two or more, and with good reason. When the self disappears, being alone is terrifying, whether in this world or its virtual version.

Is Paris burning? It's the year 2000 and perhaps Paris *is* burning—but maybe you don't care, since you've got a copy of Paris on your hard drive. The digital version of Paris is also palpably real, with over 20,000 scanned-in color images that can be displayed alongside real-time video, all in 32 bits, with 8 bits for transparency. As we play in the virtual city, we look through the transparent window of the car in the foreground, while off in the distance, simulated flames appear to destroy the Eiffel Tower. We flip to another database, the core of an ecological simulation where a whole rain forest appears to be cleared in a matter of days. We flip on our computerized TV, but we can't tell whether the war we're watching is a simulation spliced from old movies or the beginning of another real one that appears to be broadcast from the cameras of CNN and the shifting sands of the Middle East.

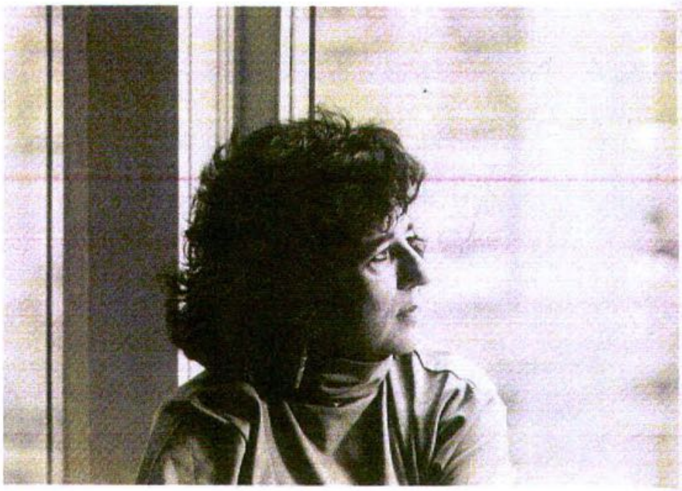
In one version of this brave new virtual world, simulation is everything and reality, nothing. How fascinating, we think, as we flip through cities with virtual lightning speed. How fascinating, too, the disquieting question, reported by the *New York Times*, that a five-year-old boy asked his father while sitting in the bleachers at a baseball game: "Dad, is this live?"

I imagine that, for the space of a nanosecond, the father had some difficulty with an answer for his son. ⊕

With thanks to Daniel Gregory, Laurin Herr, Michael Miley, Russ Newman, and Richard Schatz.

Vanishing Point *is a freewheeling site for key thinkers and futurists who do their thinking beyond the cutting edge of information technology.*

Hazel Kahan *is a psychologist living in New York City, where she runs her own market research firm.*



Vanishing Point/Hazel Kahan

It's 1992. You're an architect. You know the challenge of getting a client to visualize a building not yet built. So you sit him in front of your computer and walk him through a virtual version of it in 32-bit color.

Ghostly presences, the two of you move under a CAD version of vaulted ceilings, climb stairs, stroll from one archway to another, open the door onto the courtyard. It's four in the afternoon. In simulated sunlight the benches and bushes in the courtyard cast long, lovely shadows across the patio. He's satisfied with your plan. You shut the computer down and the patio disappears.

It's 1996. You're a cop and New York is overrun with gangs. It's as if the whole population is the enemy. At the Main Terminal Building of the N.Y.P.D., you open the door to the simulation room and find the 12 members of the counterinsurgency team already there, jacked into their terminals, waiting for you. You suit up and sit down in front of your terminal and log in to the game *To Live and Die in New York*. Your body suit is geared to give you the sensation of physical pain, of vertigo. This is called rumble training. Before you know it, it's midnight and you're out in Times Square. As you move down the street, you don't know whether or how you will be killed, or whether you will be mourned by your team. "By the knife," you think, "No doubt, I'll die by the knife."

Cut to 1991.

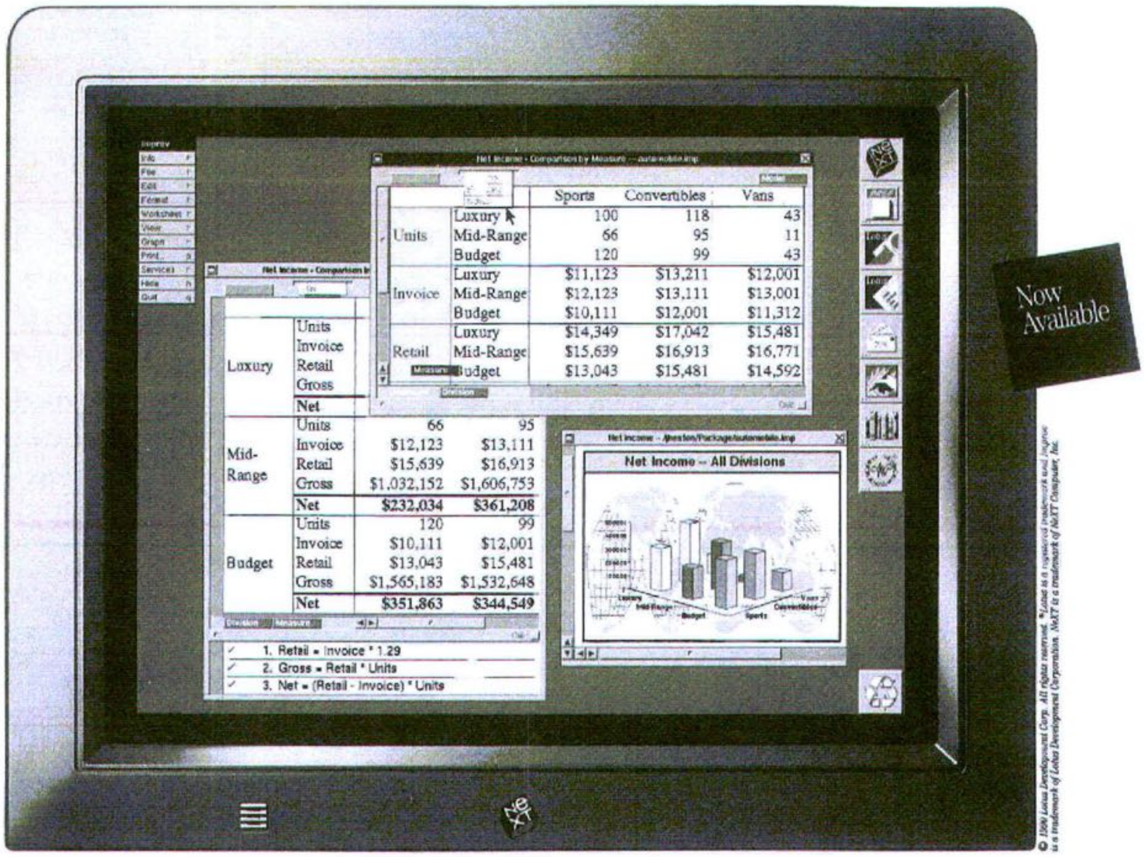
Welcome to the world of virtual reality.

It's what it's not. Virtual reality is a concept that has spread like simulated brushfire across your computer screen. Modem into a database and you'll find extensive references to virtual reality across a range of sources that go well beyond the nerd and the alternative press. Virtual reality congresses are springing up in New York's Soho, Holland, and Australia, as well as Silicon Valley. Articles are appearing in philosophical journals as well as in the "Style" section of the *New York Times* and in such staid publications as *Smithsonian*. Virtual reality has attracted so much attention that the concept no longer seems arcane or hip, as it did just three months ago. But the question remains...What is it?

The answer depends on who you talk to. Interestingly, virtual reality has become a kind of digital Rorschach inkblot onto which people who discuss it project their most personal fantasies. If you think I'm exaggerating, conduct your own experiment. If you're interested in finding out what makes somebody tick, ask him or her to describe their version of virtual reality. Complain that you don't get it. In response, you'll uncover a few juicy secrets: the adventures he wants to have, the selves she wants to explore, the personal his-

Continued on page 79

Lotus Improv.
The NeXT™ generation in spreadsheets.



Net Income - Comparison by Measure — automobile.imp

		Sports	Convertibles	Vans
Units	Luxury	100	118	43
	Mid-Range	66	95	11
	Budget	120	99	43
Invoice	Luxury	$11,123	$13,211	$12,001
	Mid-Range	$12,123	$13,111	$13,001
	Budget	$10,111	$12,001	$11,312
Retail	Luxury	$14,349	$17,042	$15,481
	Mid-Range	$15,639	$16,913	$16,771
	Budget	$13,043	$15,481	$14,592

Net Income - Comparison by Measure

Luxury	Units		
	Invoice		
	Retail		
	Gross		
	Net		
Mid-Range	Units	66	95
	Invoice	$12,123	$13,111
	Retail	$15,639	$16,913
	Gross	$1,032,152	$1,606,753
	Net	**$232,034**	**$361,208**
Budget	Units	120	99
	Invoice	$10,111	$12,001
	Retail	$13,043	$15,481
	Gross	$1,565,183	$1,532,648
	Net	**$351,863**	**$344,549**

✓ 1. Retail = Invoice * 1.29
✓ 2. Gross = Retail * Units
✓ 3. Net = (Retail - Invoice) * Units

Net Income - /people/Package/automobile.imp
Net Income -- All Divisions
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Mid-Range
Budget
Sports
Convertibles
Vans

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With the power to analyze, view, and present numbers in vastly new and exciting ways, Lotus® Improv™ is clearly unlike any spreadsheet you've ever seen before.

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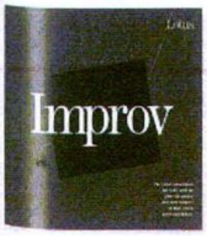
Finally, with stunning clarity and resolution, Improv produces the most compelling charts and presentations, using graphs, text, images, even sound.



For more information about Lotus Improv, call **1-800-343-5414**. One look will convince you that Lotus Improv *is* the NeXT generation of spreadsheets.

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"A stunningly simple approach to organizing complex data." —PC World, 11/90

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FALL
1991

Adobe's Best Illustrator Five Cube Rating

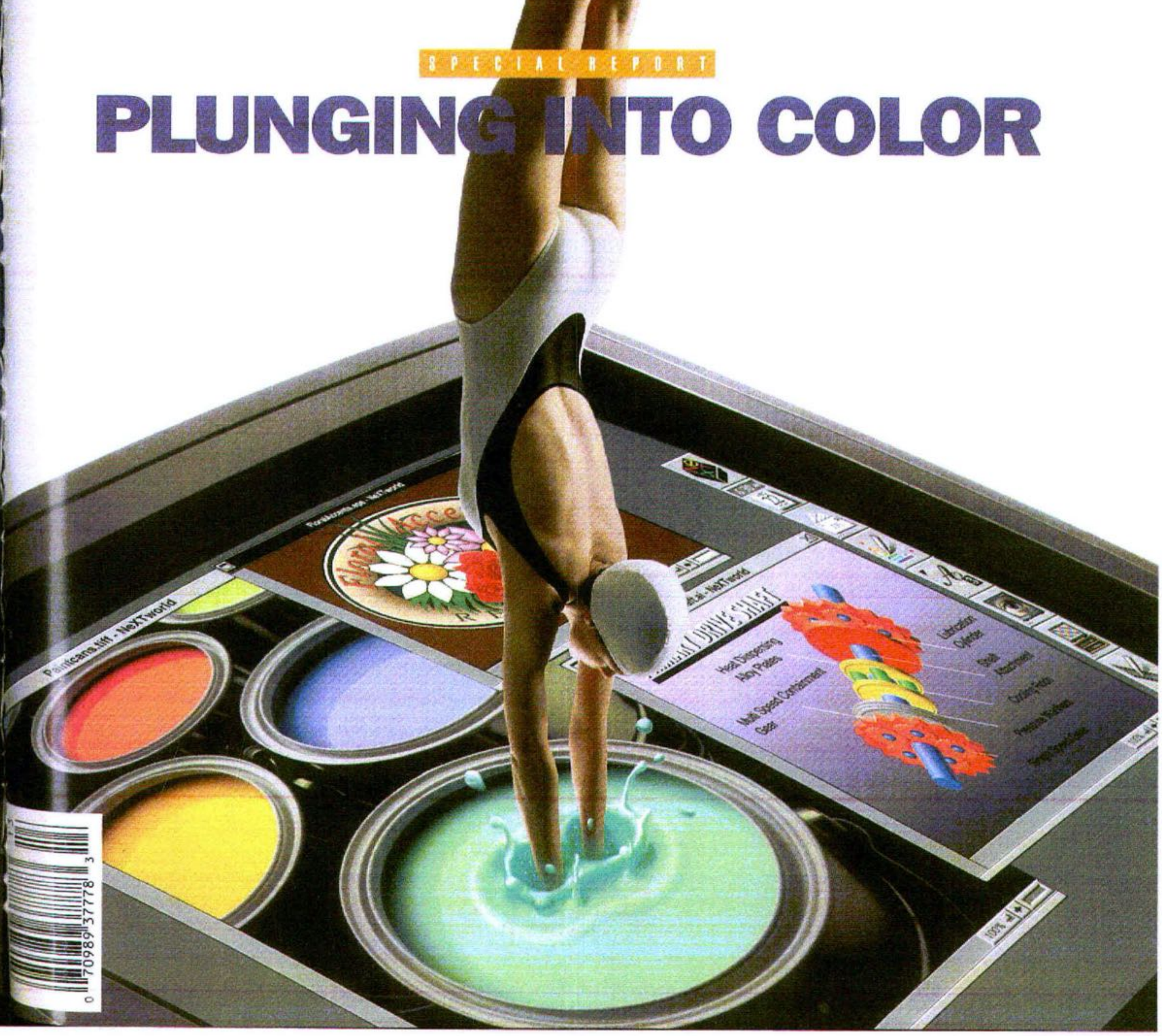
Photo Tour
A Peek Into the NeXT Labs

Bull Market
NeXT Arrives on Wall Street

New Sections
Community, News, How-To

SPECIAL REPORT

PLUNGING INTO COLOR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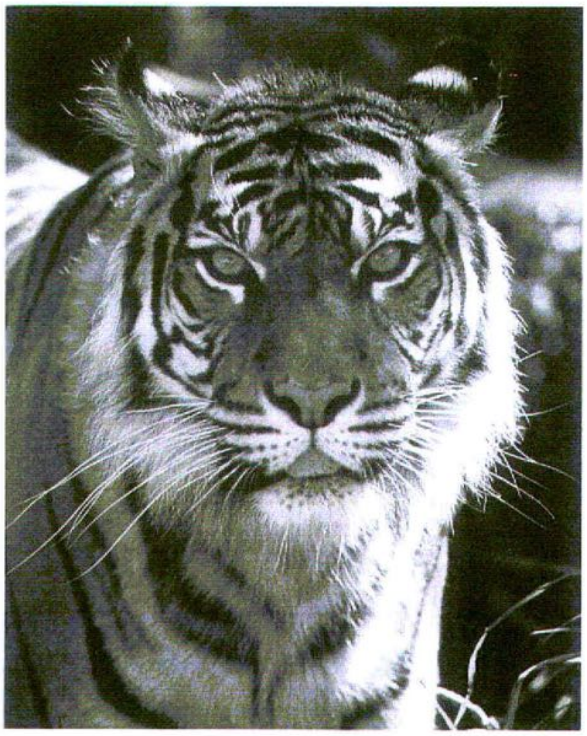
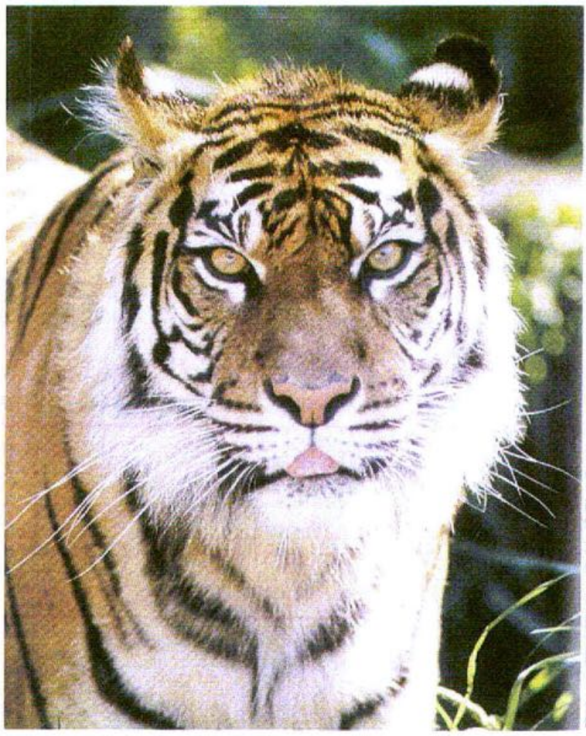
THERE'S MORE THAN ONE WAY TO SCAN A CAT





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NeXTWORLD
Fall 1991, Volume 1, Issue 3

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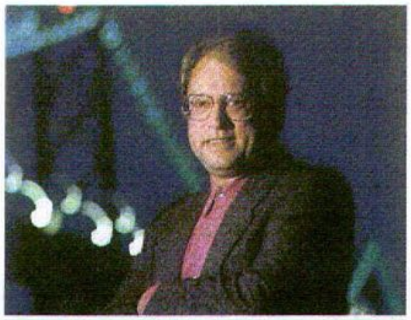
call

Ten Most Wanted

DAN RUBY



Welcome to Release 2.0 of NeXTWORLD. Thanks for your patience these last few months, but we've been busy changing a few things. If that sounds familiar to you, maybe it's because you remember the Apple 1, the Lisa, and the original Cube. Steve certainly does.

Each product was a breakthrough, but each also had a fatal flaw. The redeeming grace was that Steve followed them up with a truly hot successor. We think we've done that, too.

Here are some new things you'll find in the new *NeXTWORLD:* We start things off with a lively spread of lists, time lines, and quizzes, followed by a Community section focused on the interesting users, developers, and influencers in the NeXT world. A new How-To section in the back of the magazine is divided into segments aimed at readers with differing interests and levels of technical knowledge. Our reviews package has been enhanced with an irreverant column by John Perry Barlow and Dan Lavin, in which they trade subjective opinions of new products.

The features well is anchored by a cover package devoted to a single major theme. In this issue, the theme is color–color NeXT systems, color software, and color peripherals. And, yes, color *NeXTWORLD.* Just as NeXT thought carefully about how to implement color appropriately, our new design applies color photography, illustration, and text to boost communication and readability.

One other new element is *NeXTWORLD Extra,* a news section covering product and business developments, analysis, and rumors. *Extra* is bound into our quarterly magazine issues, and it will be sent to subscribers as a monthly stand-alone newsletter in the eight months a year that we don't publish a full issue.

There are also some things that you probably won't find in the new *NeXTWORLD.* Articles about general technology futures and the social implications of computers are interesting, but you have other places to go for that. This is a magazine about NeXT computers and related products. Sorry, Toffler fans.

Finally, some things that were in *NeXTWORLD* before are still in it. Foremost among these is our fundamental belief that NeXT systems, software, and networking comprise the most exciting computer platform available today. But we will also retain the independence to speak our minds, whether or not NeXT or a third-party vendor may like what we have to say.

Underlying it all is our mission to inform, entertain, and challenge NeXT users and buyers with a magazine that reflects the creativity and excitement of the NeXT community.

* * *

That's enough on NeXTWORLD. What about NeXT? Like everyone else in the NeXT orbit, my enthusiasm for the computer is tempered by daily frustrations over products, services, and technologies that are still missing. Let's call this wish list the "Ten Most Wanted." Feel free to post it at your local post office or, better yet, your local NeXT dealer.

① **A professional-quality, page-oriented layout program.** Ideally, it should be Quark XPress (what about it, Fred?), but here's an opportunity for somebody else to slip in first and dominate this crucial category. FrameMaker is great for what it is, but we need an application that really exploits the advantages of the NeXT environment.

② **A full-featured, programmable database front end.** I'd have also included a simple flat-file database, but Andy Stone's DataPhile (when it ships) has that covered. What's really needed is an end-user development environment with a great interface and seamless connections to Sybase and Oracle.

③ **Software for computer-aided design.** AutoCAD is the standard, but I'd rather see something NeXT-specific. What's a professional workstation without a solution for the number-one professional-workstation application?

④ **World-class 3D graphics and animation.** That's what Steve's other company, Pixar, is all about, isn't it? How about putting Renderman alongside PostScript in the operating system? That would enable great third-party apps and make NeXT the platform of choice for professional graphics applications.

⑤ **An upgrade path from the bottom of the NeXT line to the top.** It's inexcusable that NeXTcube owners can't get 16-bit color. Base NeXTstations would be even more appealing if there were a way (external bus? expansion chassis?) to add color later.

⑥ **A cheap color printer.** If NeXT would follow the same strategy on a color printer as it did with the original laser (PostScript and processing in the computer), it could smash through the $5000 price barrier on color printing and sell a lot of NeXT boxes.

⑦ **A NeXT marketing message that's as great as its technology message.** The "professional workstation" moniker is promising, but I have my doubts about it as a unique selling proposition. NeXT's biggest distinguishing advantage right now is the ease and elegance of custom development with NeXTstep and Interface Builder. I think that's the way to get it in the door.

⑧ **NeXTWORLD Expo.** Well, the ball's in our court for this one. Stay tuned.

⑨ **An on-line NeXT communication system accessible to business users.** The Internet mail and news services are great if you can manage to get on them. That's easy if you're at an academic or government site, but NeXT is targeting the professional market. The community needs a link through which we can all share ideas and information. It should be plug-and-play, so that you're on the system simply by plugging into the phone jack.

⑩ **Service and support second to none.** One advantage of a relatively small user base is that it may be affordable to provide direct support. The nascent dealer channel is beginning to build its expertise, but NeXT could really help the community by opening up the phone lines.

It would be easy to go on, but better to let you pitch in with your own "Wanted" lists. Send them to me by U.S. or e-mail, and we'll publish the most interesting ones next issue. It's a good bet that NeXT is listening.

DAN RUBY *is the Editorial Director of* NeXTWORLD.
He can be reached at druby@nextworld.com.

About face

Don't get me wrong, I think Heidi and Alvin Toffler are interesting people [*NEXTWORLD*, April 1991]. However, when I subscribed to *NeXTWORLD* I was under the impression that your magazine would devote its resources to the technical aspects of the NeXT computer.

Did you run out of NeXT subject material?

I think you should take a hard look at the purpose and mission of your magazine.

DANIEL I. SHRAGER
Philadelphia, Pennsylvania

Welcome to the new NeXTWORLD. *See Dan Ruby's column for more on our new direction.–NW*

A sound comparison?

The idea that you can actually make music on the NeXT or in conjunction with the NeXT (e.g., downloading samples from supercomputers) without using MIDI or the DSP hasn't dawned on a lot of people. I just received the latest issue of *NeXTWORLD* and was dismayed that in an article comparing the Mac IIfx, the SPARCstation2, and the NeXT, you didn't bother to mention that 16-bit, CD-quality sound output (real time from disk under UNIX, no less) is standard on the NeXT. All it says in Table 1 is that "Dual RCA line-outs" are available.

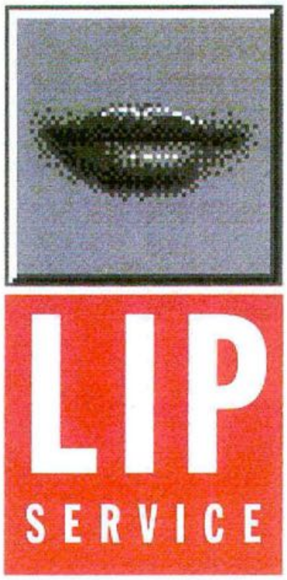
The implication is that the NeXT's sound is no better than the Mac or SPARC built-ins. In fact, the other two machines only have 8-bit output without expensive additional third-party components and software. Why don't people realize that this is a fantastic capability of the NeXT that other computers don't have without a lot of trouble?

I am also wondering about the benchmarks in Table 2. I heard that floating-point performance of the '040 was going to soar compared to the '030. The float benchmark given shows only a 46 percent improvement, a long way from the tenfold improvement I heard about last year. The text of the article makes no comment about this insipid result.

JIM BEAUCHAMP
Urbana, Illinois

Bruce Webster and Edward Jung reply: Thanks for pointing out the omission about NeXT's audio output. We would have liked to have discussed it–and a number of other topics–at greater length, but space was, unfortunately, limited.

The benchmark results show the dangers of both benchmarks and manufacturers' claims. We did our best to put in caveats about the benchmarks; we can only hope that manufacturers would do the same.



Embed with the competition

Does NeXT have "embedded architecture?" [Black Box, April 1991]. Sorry, but I don't think so.

Try writing a word processing document. Add a couple of graphics and a couple of half-page spreadsheet cells. Now close the extraneous applications but leave open the word processor document. Double-click on a graphic or a spreadsheet cell. Does this launch the requisite applicaton? No, it does not.

Try e-mailing the document to a colleague who doesn't have the same word processing, drawing/painting, and spreadsheet applications. When the colleague double-clicks on the document, does a panel pop up asking how the document should be translated? No, it does not.

When NeXT is able to do these tasks, then, and only then, can we say that NeXT supports embedded architecture. Only then can NeXT stop simply being a faster, more expensive Macintosh and start being a better PC.

A. DJOJONEGORO
Houston, Texas

You don't happen to work for Microsoft, do you?–NW

Standard bearer

In NeXT Ink [*NeXTWORLD*, January 1991], Dan Lavin wrote that a strong marketing strategy and wide customer acceptance are major factors in the success of a new computer platform. I'd like point out two other factors: standards and trends.

You cannot force new concepts just because they're better. You need to listen to the customers and to the market, and to companies that have already spent large amounts of money and will want to protect their investments before buying into new technologies. NeXT did implement certain standards like TCP/IP and NFS. However, I wonder if the market will see the PostScript display or NeXTstep as advantages if, for instance, X-Windows or the X.400 mailing protocol can't be implemented properly on them.

As a computer analyst I really like what I read about the NeXT, and I feel it has every ingredient to become a killer. On the other hand, I fear the NeXT could turn out to be some kind of cult machine for computer-fanciers.

BRUNO GERMAIN
IS analyst, Xerox Canada
Montreal, Quebec, Canada

Subscriptions

Concerning my subscription, I sent a free issue card last fall. I have since acquired a NeXTstation, and NeXT is offering a free subscription to your magazine. I have been billed. I assumed that the issue I received was due to the card I sent. Could you sort this out for me?

SYLVAIN LEVESQUE
Cambridge, Massachusetts

Our subscription policy has caused quite a bit of confusion, for which we apologize. We hope this explanation will help.

NeXTWORLD *offered a charter subscription of a free premiere issue and six additional issues. At the same time, through an arrangement with* NeXTWORLD, *NeXT Computer was offering a "free subscription" (six issues) to the magazine as part of its RSVP program, for people who bought a new machine or system upgrade. People who subscribed to* NeXTWORLD *and then bought the new machines have a double subscription: that is, 13 issues of* NeXTWORLD.

Now that NeXTWORLD *is publishing quarterly, a six-issue subscription lasts for more than a year. You'll still receive six issues, along with a monthly newsletter covering NeXT business and product news.*

To add to the confusion, we misprinted the subscription-services number in our masthead in the first two issues. The correct number is 800/755-6398. If you still have questions about your subscriptions, please call that number. –NW

***NeXTWORLD* welcomes your gripes and suggestions. Please send them to Letters at *NeXTWORLD*, 501 Second Street, San Francisco, CA 94107, or e-mail letters@nextworld.com.**

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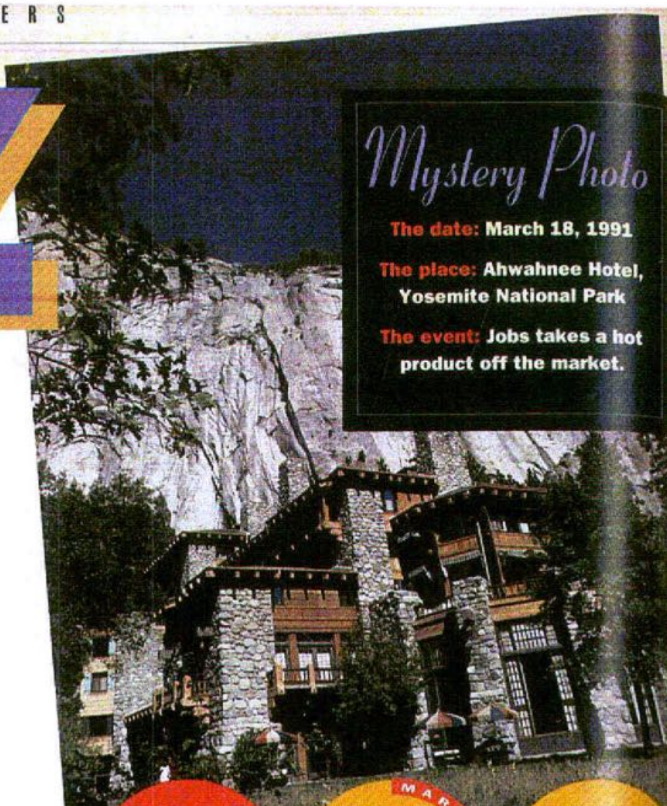
QUIZ
CODE NAMES

During the development of new products, team members use code names to maintain secrecy around the project. Can you match the code name to the final shipping product?

A. Warp 9
B. BLT
C. Back Bay
D. NeXTdimension
E. Detente
F. Gaul
G. X-15

1. **PowerStep**
2. **NeXTstation**
3. **NeXTdimension**
4. **Improv**
5. **NeXTcube**
6. **SoftPC**
7. **Diagram!**

ANSWERS AT BOTTOM RIGHT



Mystery Photo

The date: March 18, 1991

The place: Ahwahnee Hotel, Yosemite National Park

The event: Jobs takes a hot product off the market.

NeXTWORLD TIME LINE
NeXT T-shirt Edition

MARCH '86
FRONT
We're NeXT
NeXT didn't even have a logo yet.

FRONT
NeXT logo
BACK
The sign of the next generation of computers . . . for education
Higher ed is king at NeXT.

FRONT
NeXT logo
BACK
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ects with the Best
arch 30, 1989
e U.S. Businessland
nouncement.
... what about
siness, then?

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NeXTstation Color (105MB hard drive, 12MB RAM)	$7995	NeXT or any dealer
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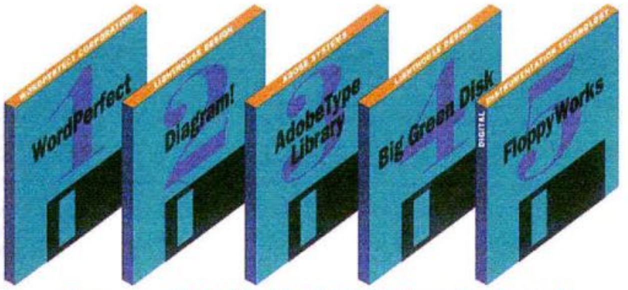
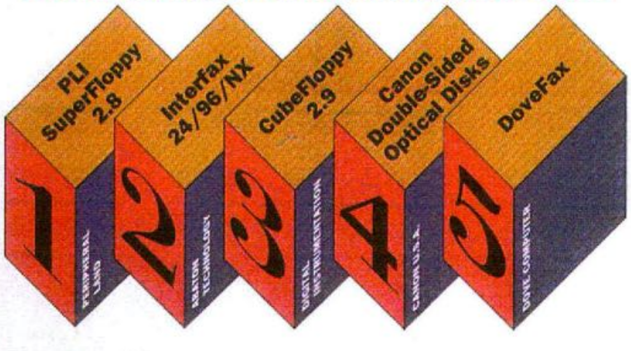
SOFTWARE	LIST	STREET
WordPerfect 1.0.1 (WordPerfect)	$499	$329
Diagram! 2.0 (Lighthouse Design)	$399	$295
Adobe Plus Pack (Adobe Systems)	$495	$199
Digital Ears 1.0 (Metaresearch)	$650	$519
TextArt 1.0 (Stone Design)	$350	$319
Improv 1.0 (Lotus Development)	$695	$549


WORDPERFECT CORPORATION
WordPerfect
1
LIGHTHOUSE DESIGN
Diagram!
2
ADOBE SYSTEMS
AdobeType Library
3
LIGHTHOUSE DESIGN
Big Green Disk
4
DIGITAL INSTRUMENTATION TECHNOLOGY
FloppyWorks
5

Best-Sellers

These are the hottest-selling NeXT products as of press time, according to NeXTConnection, a mail-order distribution source for NeXT products. Note that NeXTConnection handles most, but not all, NeXT software.


PLI SuperFloppy 2.8
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PERIPHERAL LAND
Interfax 24/96/NX
2
ABATON TECHNOLOGY
CubeFloppy 2.9
3
DIGITAL INSTRUMENTATION
Canon Double-Sided Optical Disks
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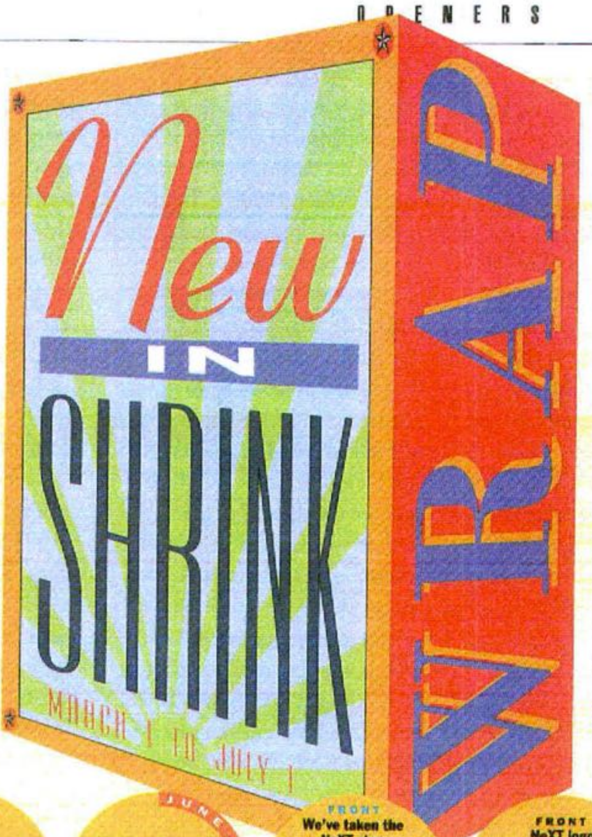
Out of the vapor

It was a banner quarter for third-party applications. With availability of Insignia's SoftPC and WordPerfect's NeXT version, no one could dismiss NeXT's viability in business. Adobe Illustrator and FrameMaker 2.0D bolstered NeXT's publishing story. And Boss Logic's BDMS and HSD's OCR Servant gave NeXT two more unique advantages. The most prominent product still in vapor: Software Ventures' Microphone II.



Developer's Tools

Hex Editor
Scheiber Consulting
Side-by-side editing
$50

PaperSight OCR Tool
Visual Understanding Systems (VISUS)
Optical character recognition
For price, contact VISUS

DTP/Graphics

Adobe Illustrator/ Separator 3.0
Adobe Systems
Graphic design and illustration
$695

FrameMaker 2.0D
Frame Technology Corportion
Complete workstation publishing
$995

Peripherals

Scan-X Color
HSD Miocrocomputer
24-bit desktop scanner
$2995

Business

Boss Document Manament System (BDMS)
Boss Logic
Work flow and multimedia document system
For price, contact Boss Logic

Contact!
Boss Logic
Contact information database
For price, contact Boss Logic

OCR Servant
HSD Microcomputer
Optical character recognition
$295

SoftPC 2.0
Insignia Solutions
PC/AT emulator
$499

WordPerfect 1.0.1
WordPerfect Corporation
Full-featured word processor
$495

Scientific

Mathematica 2.0
Wolfram Research
Mathematical computation and programming
$1495 (bundled with higher education software)

Connectivity/ Communications

Asante EN/SC
Asante Technologies
SCSI-to-Ethernet connectivity
$499

Coconut Host
Coconut Computing
Multiuser graphical bulletin board
Price starts at $395 for two users

CocoTalk API C Library
Coconut Computing, Inc.
Graphics functions
$395

co-Xist
Pencom Software
X windows X11R4 server
$249

Marble Teleconnect
Marble Associates
Commercial-grade SLIP
$295

Versalink
Morning Star Technologies
Communications adapter with X.25
$2495

Database

Objective DB Toolkit
Professional Software
Database object library
$995

Multimedia

HyperCube
Thoughtful Software
Hypermedia development
$495

SoundWorks
Metaresearch
Sound recording and editing
$395

Entertainment

Culture Shock
Athena Design
Strategy game
$24.95

For information on these products, contact your NeXT product dealer. Manufacturers: If you have a product shipping for the NeXT, please write us a *NeXTWORLD*, New Products, 501 Second St., San Francisco, CA 94107, fax us at 415/978-3196, or send e-mail to newprod@nextworld.com

FRONT
NeXT logo
BACK
Businessland
...ects with the Best
...ch 30, 1989

MARCH '90
FRONT
NeXT logo
BACK
Businessland Connects with the Best February 20, 1990
For the Europe Businessland intro.

JUNE '90
FRONT:
NeXT logo
Business is still a good idea. Businessland isn't.

SEPT '90
FRONT
We've taken the NeXT step
BACK
'040 camp September 1990
A special edition only for developers at the '040 developers' camp. Two days to intro and counting.

SEPT '90
FRONT
NeXT logo
BACK
'040 Motorola
For the '040 intro: ballyhooing the horsepower NeXT needs.

OCTOBER '90
FRONT
NeXT logo
BACK
NeXTstep x 68040 = 15 MIPS The power to be even better
For Educom '90. Apple is not amused. We are.

JANUARY '91
FRONT
NeXT logo
BACK
'80s Personal Computing '90s Interpersonal Computing
The IPC story, explicit.

FRONT
NeXT and Adobe logo
BACK
NeXT and Adobe mean great graphics
Mainstream workstation, mainstream apps.

Overheard

> "The (Improv) engine can handle 16 dimensions, but the user interface can handle only 12. We've mathematically proven that any concept in the universe can be represented in 12 dimensions."
>
> PAUL S. KLEPPNER, PRINCIPAL ENGINEER, LOTUS DEVELOPMENT CORPORATION, IMPROV DEVELOPMENT TEAM, WHEN ASKED ABOUT IMPROV'S LIMITATION OF 12 DIMENSIONS.

QUIZ ANSWERS

A-2 — It needed to be done faster than possible; Warp 8 is the maximum speed of the starship *Enterprise* in "Star Trek"
B-7 — Stands for "Sex and Lies Too!"
C-4 — A neighborhood near Cambridge, Massachusetts, home of Lotus Development Corporation
D-3 — They liked the code name so much they kept it
E-1 — Development was to be in three phases : Detente, Glasnost, and then Perestroika
F-6 — Alpha was Asterix and Beta was Obelisk, like the cartoon
G-5 — After the famous jet plane

PRESS CLIPS

NeXT ships 8000 units in Q1

It's taken a few years, but Steve Jobs thinks that he has finally figured out how to define his sleek but slow-selling NeXT computer: It's a "professional workstation." . . . Conveniently, this niche is small enough for NeXT to be a major player yet is growing fast enough to be worthwhile.
— Jonathan Weber, Los Angeles Times, April 15, 1991

With his NeXT machine lagging badly in the computer workstation market, Jobs last week called a gathering of reporters to announce the existence of a hitherto unknown market in which his company was (surprise!) No. 2.
— Bits & Bytes, San Jose Mercury News, April 10, 1991

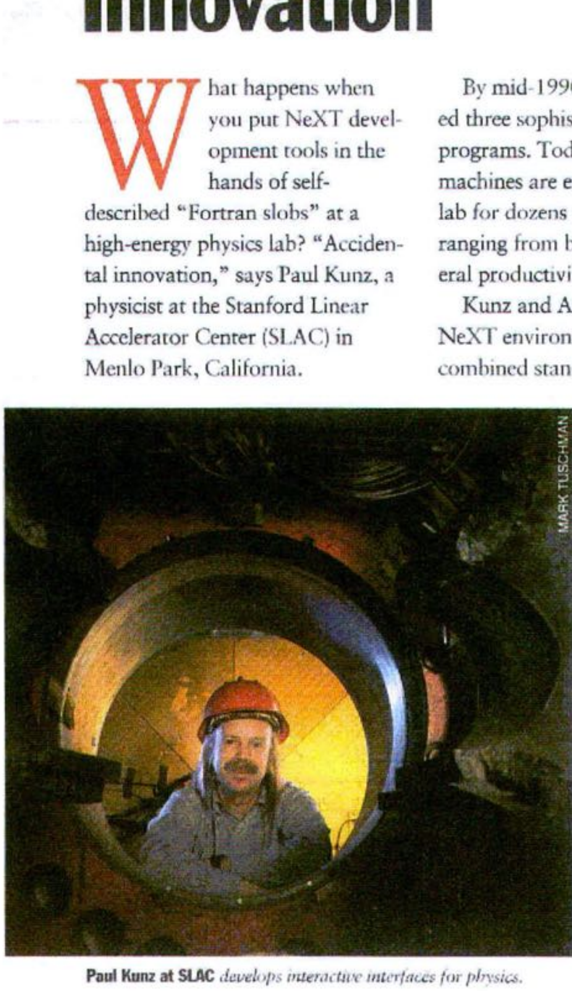
The handful of commercial buyers who have already bought NeXT machines say they're impressed. . . . "You can't put a box on someone's desk that they'll like more than the NeXT," says Hadar Pedhazur, equities technology manger at UBS Securities Inc., which owns 14 NeXT workstations. Now, all the newlywed Jobs has to do is court several thousand more corporate sweethearts.
—Barbara Buell, Business Week, April 15, 1991

Perhaps too much was expected of Steve Jobs. "There are a lot of people who do one incredible great thing and then we never hear from them again," says Apple's [Deborah] Coleman. "J. D. Salinger wrote *Catcher in the Rye*, but what else has he done?"
—Julie Pitta, Forbes, April 29, 1991

Maybe NeXT is just filling the pipeline. . . That would mean that the sales will fall off and NeXT will go back to being the failure everybody thinks it is. I don't think that's true. I think Jobs has got his third winner. . . . And I can see how the company's momentum will continue to build and launch it into the ranks of first-tier computer companies.
—Stewart Alsop, InfoWorld, April 8, 1991

Accelerating Innovation

What happens when you put NeXT development tools in the hands of self-described "Fortran slobs" at a high-energy physics lab? "Accidental innovation," says Paul Kunz, a physicist at the Stanford Linear Accelerator Center (SLAC) in Menlo Park, California.



Paul Kunz at SLAC *develops interactive interfaces for physics.*

"It's so easy to try out your wildest ideas that you do it, and some of them work. If it would take two weeks to implement an idea, you'd never try it. But two days, that's easy," Kunz says.

Kunz's wild idea was to apply a visual, interactive interface to statistical analysis of the behavior of elementary particles at SLAC, one of the world's premier sites for high-energy physics. Kunz and his colleague, William Atwood, installed two NeXTcubes in June 1989. Two weeks later, they had their first "toy project" up and running, and by the end of the summer, the basic pieces of their Reason program were functional.

By mid-1990, they had completed three sophisticated analytical programs. Today, 24 NeXT machines are employed in Kunz's lab for dozens of applications, ranging from basic research to general productivity.

Kunz and Atwood settled on the NeXT environment because it combined standard UNIX networking and development tools with a graphical user interface on a high-performance platform. All that was missing was a Fortran compiler, a gaping hole in a research field that is traditionally based on Fortran.

Most computing work at SLAC and other accelerator centers around the world is done with Fortran running on DEC or IBM mainframes. Therefore, Kunz and his colleagues had virtually no experience with UNIX or object-oriented programming. "We were just a bunch of Fortran slobs, but we know how to do analysis. We just applied it to the NeXT graphical environment."

Reason is a statistical program for analyzing the characteristics of elementary particles in a particle accelerator. It produces histograms that show the distribution of particles according to user-selected parameters, but it does so in a highly interactive format.

With Reason, the user specifies the analysis criteria by building a visual program from a palette of objects. The user can zoom in on the histogram to see the fine structure of the data or can change the scale by using a slider. Changing the display does not require rerunning the calculation, so the program provides almost instant feedback, letting the user explore the data interactively.

The use of the slider to change the histogram scale was an example of accidental invention, Kunz says. "It was just an idea that came up in the course of a long-winded discussion," but when implemented a few days later, it turned out to be a major improvement in the program.

Another program Kunz's colleagues developed is a version of a standard minimization program that fits the histograms generated in Reason to statistical functions. Each parameter of the function can be connected to a slider, enabling the user to manually redraw the curve to examine the extent to which the function depends on that particular parameter. The curve actually changes on the display as the slider is moved.

While Kunz's interface to the program is new, the computational kernel is a 20-year-old physics analysis tool comprising 7000 lines of Fortran. Revitalizing old programs is one of the key benefits of Interface Builder, Kunz believes. "There are hundreds of thousands of programs out there that have nothing wrong with them except their user interface."

If Kunz's experience is at all typical, reclaiming old programs or building new ones is not a daunting task. Kunz attended a NeXT developer camp, but he felt out of place and ultimately didn't need much help from NeXT. "We just struggled along and achieved great results on our own," he says.

Mother of Invention

Everyone at NeXT knows Bambi. Although her official job is providing administrative- and project-management support to the company's eight advocates, Bambi Fernandez acknowledges that she's best known as NeXT's "corporate mom."

"NeXT is a company run by bright, busy kids," says Bambi, "and it's my job to look after some of them." She developed her special talent for fostering creative young people while raising four boys of her own. It was her eldest, Bill Fernandez, who earned an important place in Silicon Valley's history by introducing the "Two Steves"–Jobs and Wozniak–to one another. Together, the Steves founded Apple Computer, and Bill Fernandez became the company's first employee.

"When Bill was 13 years old, he and Steven (Jobs) were in the right place at the right time," says Bambi of the computer course the two youngsters attended together at Homestead High School, in Sunnyvale, California.

"That's what got them started," she says, recalling the escapades of the precocious youths. "They'd raid garbage cans for discarded electronic parts, then spread them out all over the living room floor."

SEND HELP
MARK TUSCHMAN

Bambi Fernandez:

"With Interface Builder and NeXTstep's object-oriented programming, the drudgery is done for you. It lets you keep your mind on the problem at hand."

Kunz is so enthralled with the capabilities of Interface Builder that he wonders why NeXT is not marketing it more aggressively.

"Interface Builder is NeXT's true advantage. The difference is that you go to work with the attitude, 'What fun can I have today?' With other programming environments, it's, 'How long is it going to take to finish this task?'"

"If you put this tool in the hands of people who know their own business, as opposed to the business of programming, that's when you get real innovation," he says. ◆

by DAN RUBY

At NeXT, her mothering extends to a larger family. On any given day, she tends to an average of 50 e-mail messages and phone or in-person queries, and manages requests for information or support from her team members and other company executives. "I'm usually working on three things at once. I'm grateful that my NeXTcube is inherently multitasking–" she says with a gusty phew, then adds, "–like me."

"Bambi's the ultimate team player," says Scott Love, NeXT advocate. "Whether it's jumper cables or a hard-to-get phone number–or just for a reach into the big candy jar she keeps stocked with sweets–Bambi always gives you what you need." Does that include scoldings for late expense reports, as well? "She's never come after me with a stick . . . yet." ◆

by JOE HUTSKO

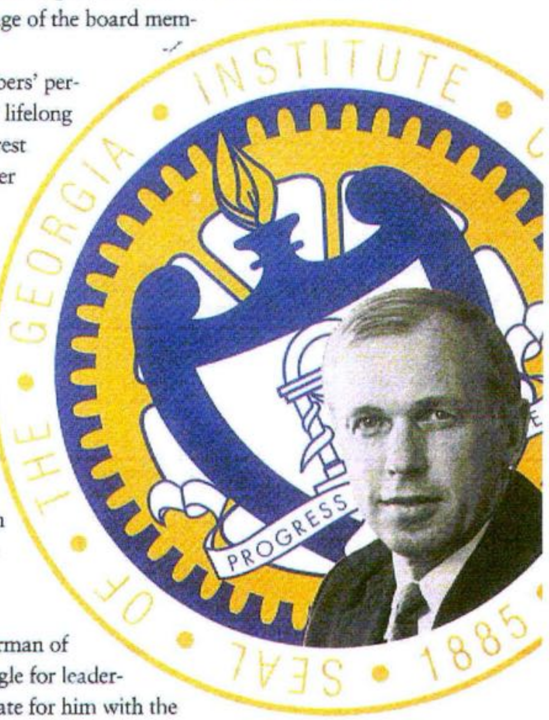
Odd Man In

John "Pat" Crecine, president of Georgia Tech, jokes that he was chosen as the third member of NeXT's board of directors—joining billionaire technologist H. Ross Perot and multimillionaire company founder Steve Jobs—"to lower the average of the board members' personal net worth."

Besides raising the average of the board members' personal sense of humor, Crecine also contributes his lifelong involvement with computing and—of special interest to NeXT's original target market—its role in higher education. Calling himself an "aggressive user" since high school, Crecine described a paper he wrote about computers in 1957, which included a machine-language program he developed solely from reading manuals. He was able to actually implement the program two years later, as a student operating the mainframe at Carnegie Tech's business school from 2 a.m. to 4 a.m. on Sunday mornings.

Returning years later to what became Carnegie Mellon University, as senior vice president of academic affairs, Crecine inaugurated the country's first graduate school of computer science and headed the Interuniversity Consortium for Educational Computing—which, interestingly, chose the UNIX operating system as the answer to higher education's computing problems.

Involvement in the consortium led Steve Jobs, then chairman of Apple Computer, to get to know Crecine. Later, in the struggle for leadership at Apple, Jobs called on Crecine for advice and to mediate for him with the company.



Georgia Tech president Pat Crecine *brings an education outlook to NeXT's board of directors.*

As a member of the NeXT board, Crecine has had the opportunity to admire Jobs' intensity, aggressiveness, and attention to detail—"which ultimately translate into quality of product"—while, for example, spending three to four hours standing around prototypes of the NeXT cube debating what shade of black it should be.

"American industry would do well to emphasize attention to detail and attention to both the aesthetics and functionality of design–the way Steve does," says Crecine. "There is no reason things have to be ugly to be functional."

As for the platform Crecine refers to as the "workstation for the masses," he believes that "the ability to do rapid prototyping of database applications is really going to be the key to NeXT's success in the corporate market." He feels that the NeXT's breakthrough is in "suggesting what a very simple multimedia device can be. What we need now is the equivalent of PostScript for multimedia.

"The ideas that are in the NeXT machine will be embedded in whatever the leading platform of the '90s will be, whether that is NeXT or something from somebody who has been smart enough to see the importance of these ideas and implement them in some other way."

At Georgia Tech for the past four years, Crecine has continued his educational innovations, creating the country's first college of computing. And he has been heavily involved in Atlanta's successful drive to host the Olympic Games in 1996. An innovation dreamed up by Crecine for the bid, and implemented by Georgia Tech researchers, is a 3-D computer model of the city, enabling viewers to select and fly through its hotels, athletic venues, and other landmarks. Crecine also continues to keep his fingers on the programming keys, currently using his NeXT to create a graphics front end to an urban spatial-location model.

In his increasingly spare spare time, the poorest NeXT board member also continues another pleasure from high school days–fast-pitch softball pitching. He employs an intimidating side-arm-like underhand delivery that once reached 80 to 85 miles per hour, "but now is only in the high 60s, on a good day. Now I really need to go after the corners, I've got to finesse it"–which is what many say he is doing off the field as well. ◆

by STUART SILVERSTONE

Brick by Brick

Building software is very much like designing buildings, says Andrew Stone. "The intricate wiring and plumbing must be interconnected seamlessly. It doesn't really matter whether you're using bricks or object modules."

Stone Design's Andrew Stone: *Using software building blocks.*

DAN BUDNICK

Stone and partner Kris Jensen are the heart of Stone Design, a NeXT software developer in Albuquerque, New Mexico. Stone Design has already brought out a text-styling program named TextArt and will soon release two more packages: a graphics application called Create! and DataPhile, a flat-file database manager.

"I've always been big on tools," says Stone. Pursuing that interest, he studied architecture at the University of New Mexico (UNM) in the 1970s. Eager to be self-reliant, he also studied industrial arts, including welding, woodworking, and metalworking. After picking up an architecture degree, he started a company to design and build custom homes that are heated and cooled totally by solar energy. Stone's work with computers evolved out of this first career.

In 1980, Stone bought a Tandy TRS-80 microcomputer to help him do cost estimates for his business. By 1984, he had moved to a PC but still used it only for estimates. Not until he bought an Apple Macintosh, in 1985, did he finally warm to computers. He began producing floor plans with MacDraw.

"As the Mac revolution took off, I was very involved in my local user group," Stone says. "The Mac loosened me up and got me involved in programming. I just got to a point in life where I thought this was more fun than what I'd been doing."

Kris Jensen used to be a labor lawyer in California. She started computing with programmable calculators and an Apple II in 1980. "Soon I was rushing home from work every night to throw myself in front of the computer," she recalls. Classes in BASIC, Pascal, C, HyperTalk, and Objective C followed. She became involved with the Macintosh and served as president of the Mac user group in Albuquerque. In addition to being a partner in Stone Design, Jensen is currently working on a doctorate in computer science at the UNM, doing research on user-interface design.

The NeXT endeavor began two years ago, when Stone and Jensen attended a NeXT demonstration. "After the show, they took us out to dinner," Stone recalls, "and the first thing we said was, 'How do we get one of these machines?!'" Because the educational option was out–UNM hadn't set up any deal with NeXT–the NeXT representatives told Stone and Jensen that they would have to become developers. So they did.

Stone Design's first product was TextArt, a drawing package and publishing tool that allows users to manipulate and execute complicated effects on text simply by clicking buttons and dragging sliders. Stone revels in the NeXT's Display PostScript but admits that TextArt had its genesis in his frustration with the language: he was a PostScript hacker who couldn't type. As a result, he decided "to parameterize all of PostScript such that you just have knobs, dials, and wheels for the commands" instead of using a keyboard.

TextArt allows users to style text into circles, arcs, or roses, add shadows, or skew letters. An intuitive interface makes it easy to transform Adobe fonts into display type. Professional publishers use it to create headlines and packaging logos; amateurs create letterheads and party invitations. TextArt files can handle Encapsulated PostScript (EPS) and TIFF graphics as well.

Stone says that as he refined TextArt, he "found a new program emerging–one that could handle not only PostScript text but graphics as well." Create!, a superset of TextArt with graphics, capitalizes on color.

The third product in Stone Design's quiver is DataPhile, a flat-file database manager. The program was prompted both by suggestions from NeXT and, once again, by necessity in Stone's own business. The goal was a database manager that "somebody familiar with flat-file database concepts and the NeXT could use immediately without reading anything," explains Jensen, who created the structure and internal workings of DataPhile. Stone, who is working on the interface for DataPhile, points to its ability to handle not just conventional types of data (text, date, numeric, and monetary) but pictures and sound as well.

Stone and Jensen have agreed that after DataPhile ships, they will concentrate on getting back to the original proposal they made to NeXT to obtain developer status: "To make Acme Gizmos, hundreds of really powerful objects we've developed." Such a collection of objects, or "gizmos," would be a tool kit for programmers. Stone Design will create "the right model and glue for people to easily put together" pre-built and tested software elements to plug in and create their own programs. ◆

by Philip Robinson

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Field Reports

Threads From the Net

Confusion reigns over monitor policy, and this has spilled over into the news group. If you're seeking an alternative to the standard NeXT 17-inch color monitor, the old Sony 16-inch monitor reportedly works with an RGB adaptor, or you can choose your own (be sure to get a pixel clock rate of at least 100MHz, vertical scan rate of 68Hz or more [non-interlaced], and most importantly, a horizontal scan rate of about 61KHz or better). NeXT MegaPixel Displays have now aged and defocused significantly (an indication of NeXT's maturity); some posters focus them at home, but a call to authorized service is NeXT's suggested course of action.

*

As more and more new applications begin to ship on the new 2.88MB floppy format, old Cube owners are left with only the unsavory option of purchasing a $500 external floppy disk drive. Especially painful is the plight of new 68040 upgrade purchasers, who have the connector for the new internal floppy drive right on their new board but no possible means of buying one (Sony will not sell to individuals). One impassioned poster said, "I know at least five other Cube owners who would be willing to [buy one]. PLEASE sell us the internal floppy drive!!!!" Another quickly replied, "Make that six."

With prices of $9 per 2.88MB disk from NeXT Connection, and about $7 from NeXT, for developers, many posters wondered who would enter this brave new world when 1.44 MB disks are only 75 cents.

*

In the archives: Real games (e.g., BoinkOut, BlastApp) began to appear on a regular basis, a good sign that the NeXT is becoming a more personal computer; NeXT submitted many new articles, Q&A sections, and manuals not provided with the system (hopefully an ongoing process); and many new developers are distributing demo versions of their apps in the archives as well (a telephone call and credit card can fully enable a demo copy).

The archives of public software on the net continue to grow. Some users at MIT have put together a list of Frequently Asked Questions (FAQs) that is separate from NeXTAnswers. Carlos Salinas of Cal Tech reports that it is packed with useful information. Available at your favorite archive site. NewsGrazer, a simple but useful NeXT front-end for newsreading written by NeXT employee Jayson Adams, demonstrates NeXT's continuing presence on the net. E-mail a message with the Subject help to archive-server@nova.cc.purdue.edu for more information about the archives.

*

Readers were happy to see new alarm chips in the NeXTstation Color, which allow the machine to automatically power on and off at given times and to reboot after power failures. Readers also hope they'll spread to the other machines.

*

Lots of people have complained about the modem-cabling problem on the NeXT. Thanks to the advocacy of Marble Associates, Altex Electronics (800/531-5369) will now ship correctly wired black modem cables for the NeXT 68030 or 68040 (ask for them by machine name) for $8.95. Mac and other modem cables are not wired properly but may work for the simplest devices.

*

There has been a lot of discussion about subscription problems with *NeXTWORLD* magazine. In the words of Dr. Barry Merriman at UCLA, "I wonder if this discussion will make it into *NeXTWORLD's* "comp.sys.next" column, which features the hot topics on this newsgroup :-)." Well, it did. The complaints in the newsgroup have had a significant effect on the way our credit and circulation departments do business. For a full reply, see our response on the net.

*

Readership of comp.sys.next has been skyrocketing in the past few months. By early March, an estimated 46,000 people (3.9% of all netnews readers) were participating.

User Group News

The user group e-mail alias list put together by Conrad Geiger has proved to be a very effective communication path for the user group community. Messages go immediately to almost all user groups and then ripple to individual members through automatic forwarding. You can contact Geiger at user_groups@next.com to be added to this list or to send messages to this list. Other new electronic mailing lists have sprung up over time and are now quite busy. Among them are: nug (NeXT User Group discussion), next-prog (programmers), next-lab (groups of NeXTs), and next-managers.

*

The user group community has now grown to 123 groups in 35 states and 10 foreign countries. Some new groups in Europe include Italy and the United Kingdom. Corporate groups include AT&T and Motorola. Total membership now tops 7000.

*

There is a new NeXT SIG on Portal. Roger McBride is the moderator. You can reach him at rmcbride@cup.portal.com

Compiled by DAN LAVIN AND CHARLES L. PERKINS

NeXT Events

JULY–OCTOBER 1991

TRADE SHOWS

NeXT will exhibit or Steve Jobs will speak at these shows.

September 23. Agenda 91 (Stewart Alsop's annual industry gathering), Laguna Niguel, California.
415/592-8880

October 1–3. Seybold Conference
San Jose, California.
213/457-5850

October 16. German Computer Science Society, Darmstadt, Germany.
49-6151-155-199 fax

October 16–19. EDUCOM (largest annual conference on computers in education), San Diego, California.
202/872-4200

October 21–25. COMDEX
Las Vegas, Nevada.
800/325-8850

October 30–November 1. UnixExpo
New York, New York.
212/391-9111

USER GROUP MEETINGS

Over 100 NeXT user groups exist around the world. This list includes meeting times for the largest ones. For the name of the group nearest you, call 415/848-NEXT or e-mail usergroups@next.com.

BANG, Bay Area NeXT User Group
415/327-BANG
July 17, August 21, September 18, October 23. Meetings are in Terman Auditorium, Stanford University, at 7 p.m.

The Boston Computer Society NeXT User's Group
617/252-0600
July 2, August 6, September 3, October 1. Meetings are in Room 1-130, MIT.

DaNG, Dallas-Ft. Worth NeXT Group
214/830-2472
July 31, August 28, September 25, October 30. Meetings are at the Bozell Advertising Agency, 210 East Carpenter Frwy., Irving, Texas 75062, at 7 p.m.

rmNUG, Rocky Mountain NeXT User Group, Denver, Colorado
303/492-2545
July 10, August 14, September 11. Call for meeting locations.

WANUG, Washington NeXT User Group, Washington, D.C.
703/742-0470
July 3, August 7, September 4, October 2. Meetings are at the MITRE Corporation, McLean, Virginia, at 7 p.m.

If you have information about upcoming events of interest to the NeXT community, send an announcement to NeXT Events, NeXTWORLD, 501 Second St., San Francisco, CA 94107, or e-mail events@nextworld.com.

NeXTWORLD
EXTRA
AUGUST 1991

NEWS IN BRIEF

Lotus Development announced that its Improv Application Programming Interface toolkit shipped during May and that several developers are using it to release the first Improv add-ons. Objective Technologies is in alpha release with OTProvide, a data-base link and SQL query manager; Marble Associates planned an early-July ship for Marble Teleconnect, a decision-support product; and Atlas Consulting Services is beta-testing Atlasphere, a customized time and billing system for the legal profession. Registered Improv users and NeXT developers can receive the toolkit free by calling 800/345-1043.

WordPerfect owners who bought the product before April may not know that a new version without most of the bugs found in the January release is now shipping. Following its common practice of in-line upgrades, WordPerfect made no announcement of version 1.0.1. While registered owners can upgrade for free by calling 801/228-9910, they were not notified that the upgrade was available. According to WordPerfect, only 20 percent of the current installed base were shipped the original version, and most have since upgraded.

CompuServe Information Service (CIS) launched an on-line forum focused on the NeXT computer. The new service will give access to NeXT message threads, program libraries, and live conferences to CompuServe's more than 600,000 subscribers. Call 800/848-8199, ext. 235, for information. Current CIS subscribers can access the forum by typing "go nextforum."

RenderMan Toolkit, a system that creates synthetic computer images that are virtually indistinguishable from photographs, is now shipping for the NeXT computer. It is priced at $2500.

The program is run from the UNIX command line, accepts input files in Pixar's standard RenderMan Interface Bytestream (RIB) format, [CONTINUED ON PAGE 15]

NetWare and AppleShare support to fulfill promise of mixed networks

Free floppy upgrade will provide transparent access to PC and Mac files

by ERIC ADAMS

Redwood City, CA – NeXT will offer transparent access to files on NetWare and AppleShare networks, possibly as early as this fall, according to Kevin Wells, a NeXT software product manager. The client software will be bundled with NeXT's operating system at no additional charge.

"Basically [the software] will allow users to see Novell and AppleShare file servers in the Browser," said Wells. Support for AppleShare and NetWare printers will also be included with the software or follow shortly, he added. The native-mode implementation obviates the need for network administrators to outfit each client with a NetWare Loadable Module to support NetWare.

NeXT hasn't determined how the software will be made available to current users. "If it works on top of 2.0 and we can make it work with an add-on disk, then we'll probably try to make a product like that available," said Wells.

Historically, NeXT has not made a profit on system software upgrades. "We've only charged for the cost of media and licensing," Wells said.

Wells wouldn't say when the client software would be released, but at an April 5 press conference, Steve Jobs said that "full Novell client and Apple EtherTalk support" would be available this fall.

"Having a NetWare interface available to the client obviously makes more sense than having just NFS," said David Kosiur, editor of *Connections Journal*, a Macintosh network journal published in Fullerton, California. NFS is Sun Microsystems' Network File System, which is included with the NeXT and requires a TCP/IP network. [CONTINUED ON PAGE 15]

Microphone narrows telecom gap

by DAN LAVIN

Berkeley, CA – NeXT's gap in general-purpose telecommunications software narrowed last month when Software Ventures shipped beta copies of Microphone II. Originally scheduled for release in the first quarter of 1991, the program is now headed for a general release in the fall, according to the company.

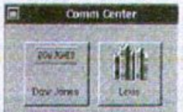
Microphone II combines terminal emulation, scripting, and user-interface tools. Versions of the software are available for the Macintosh, Windows, and DOS, but the NeXT product is more than a simple port, said David Hindawi, president of Software Ventures.

The user-interface tools are completely customized for the NeXT. Microphone will ship with a palette of objects that are used directly with Interface Builder to create completely NeXT-compliant user interfaces.

"It will be the most sophisticated version of Microphone that we offer," Hindawi said.

He explained that Microphone could be a complete communications center for a NeXT user, acting as a front end for remote information services, remote mail servers, electronic bulletin board services, and local and remote databases. Microphone will support all major protocols to communicate with a full range of remote hosts. Scripting tools provide a complete programming language for automating the connection to these hosts.

Software Ventures has seen significant international interest in the product already. "There is no satisfactory product for communications in the NeXT marketplace right now," said Sylvia Paull, director of marketing.



Microphone II lets you create a custom, icon-based command center for connections to on-line services.

Microphone II for the NeXT will cost $395. Software Ventures, 2907 Claremont Ave., Berkeley, CA 94705. 415/644-3232.

C-Cube ships JPEG, but too late for ND

by DAN LAVIN

Los Angeles – C-Cube Microsystems announced at the Digital World conference that it has finally shipped its JPEG (Joint Photographic Experts Group) compression chip, but the shipment came too late for NeXT.

The C-Cube chip was originally to have been ready last fall. Because of the delay, NeXT removed the chip from the NeXTdimension video board, which shipped to customers in May. JPEG capability would have enabled NeXTdimension to capture full-motion video to disk.

At Digital World, Steve Jobs called for a joint effort to develop "a CD player on steroids."

"C-Cube blew it," said Steve Jobs, NeXT's Chief Executive Officer, in a speech at Digital World. Jobs also endorsed the MPEG [CONTINUED ON PAGE 15]

NeXT offers direct support to users and dealers with NeXTedge service program

by LAURA FREDRICKSON

Redwood City, CA – For the first time, NeXT users can get on-site service, software support, and training directly from NeXT. The company has consolidated all of its hardware service, software support, and training under its new NeXTedge program, with services offered to users and resellers.

"We have an obligation to empower resellers to provide the same quality of product that customers would get directly from NeXT. The challenge is to ensure that customers get uniformity of service and support," said Paul Vais, director of NeXTedge.

Dealers and resellers will receive training, service, and support for their own NeXT equipment plus technical information, updates, and product templates to help them provide services to their customers. "We think we're going to benefit with a service staff that is better trained," said Steve Sharbach, a manager at Computer Attic, a NeXT reseller in Palo Alto, California.

NeXT has set up two Education Centers, in Pittsburgh and Redwood City, [CONTINUED ON PAGE 15]

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NEWS ANALYSIS

NeXT draws battle lines for 'pro workstation' market

by JOHN BATTELLE

If nothing else, NeXT chairman Steve Jobs can be content with his power of prediction. When he said three years ago that the future of desktop computing lay with UNIX and graphical user interfaces, many scoffed. But today the NeXT machine has become what some are calling "the first computer designed for the '90s," and most of the workstation field is scrambling to provide features that NeXT already has.

But features alone don't make a horse race, as NeXT has learned through several years of painfully slow sales. So it's no surprise that the company tooted its own horn when it showed its first respectable shipment numbers in the first quarter of 1991. NeXT claimed 8000 units shipped, compared with fourth quarter 1990 numbers of 44,000 for Sun, 20,000 for Hewlett Packard, and 12,000 for IBM. DEC also came in with 8000.

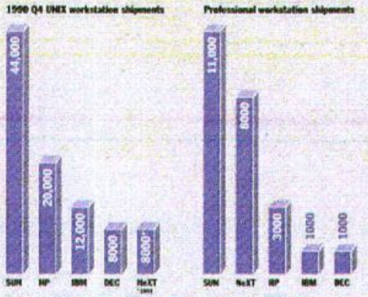
But NeXT says it is selling into a new niche, the "professional workstation" market, rather than the scientific and engineering workstation realm. In the professional workstation market, NeXT asserts, its 8000 machines sold is second only to Sun's 11,000 units.

The professional workstation

NeXT defines a professional workstation as one that "combines the power and networking of today's best workstations with the ease of use and productivity applications of today's best personal computers." According to George Pavlov, manager of NeXT's sales strategy team, people who use them have hit a "technical ceiling" with personal computers. These users are developing mission-critical applications and running large networks, and they require more powerful versions of productivity software, such as spreadsheets and databases. They are also interested in multimedia and electronic mail.

NeXT is not alone in recognizing this new market. International Data Corporation (IDC), an industry research firm, estimates that 300,000 professional workstations will be sold in 1992, compared to 50,000 in 1990. "We are pretty bullish on that market," said Doug McLeod, editor of IDC's *Computer Industry Report* newsletter.

NeXT gains in professional workstation market



Source: International Data Corporation, NeXT Computer

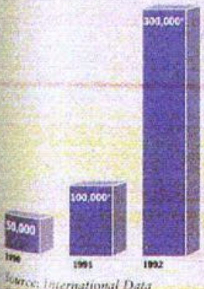
In addition, every major computer company has targeted this hybrid workstation/personal computer market–PC makers with high-end machines, workstation vendors with entry-level offerings. And a consortium of 21 computer manufacturers, including Compaq, DEC, Microsoft, and MIPS recently announced ACE (Advanced Computing Environment), which they claim will bridge both markets by supporting major PC and workstation hardware and software standards.

But ACE, which will be based on the not-yet-shipped MIPS R4000 RISC chip, is still a long way off. For the present, that leaves NeXT with four tough competitors in the professional workstation market: Sun, Hewlett-Packard, DEC, and Apple.

Price and performance

The professional workstation market can be broken down at two major price points: $10,000 for color and $5000 for monochrome. Many manufacturers, including NeXT, Apple, IBM, Sun, HP, DEC, and Compaq can claim machines in these price ranges, but performance and standard equipment vary widely.

Professional workstation market poised for growth



Source: International Data Corporation

Low-end workstations based on UNIX and RISC or high-end CISC processors can claim robust features, such as true multitasking and built-in networking, but the actual systems often come up short. Sun's lowest-priced workstation, the SPARCstation SLC, retails for $4995. It runs at 12.5 MIPS and 1.25 MFLOPS. But for that price you get a bare-bones monochrome system with 8MB of RAM, no hard disk, and no system software.

The company that is closest to NeXT in terms of price and performance is Hewlett-Packard. The HP Apollo 9000 425e workstation lists for $5490 and features a 25MHz 68040 processor (the same as the NeXT's) and can display 256 shades of gray (compared with four shades on the NeXT). But the workstation lacks a local hard disk, and an internal 3.5-inch floppy disk drive costs another $500.

DEC gives more bang for the buck: its $4995 DECstation 3100 runs at 15 MIPS and 4 MFLOPS, but like the others it is monochrome and diskless.

High-end personal computers, such as Apple's Macintosh IIfx or IBM's PS/70 series, offer workstation performance and a full set of software configurations but can cost well over $10,000. PC manufacturers' less expensive models cannot claim workstation performance.

By comparison, NeXT offers its four-tone grayscale NeXTstation, based on Motorola's 68040 processor, for $4995. That price includes a 105MB hard disk, 8MB of RAM, a 2.88MB floppy, and built-in Ethernet. It also includes what may be the industry's most elegant graphical user interface, a dictionary, built-in multimedia support, mail, a thesaurus, word processing software, and a host of other programs. Its performance–at 15 MIPS and 2 MFLOPS–is well within its competitors' range. NeXT's color offerings–at up to $4000 less than rival workstations–are also a value.

So why doesn't it sell like hotcakes?

Applications support

The professional workstation is in part defined by the existence of powerful productivity applications and hardware peripherals. High-end PCs have a slew of them; low-end workstations are still struggling to attract developers. While there are more than 2000 applications written for Sun's machines, the applications directory reads like an introductory text in graduate-level engineering or chemistry. Only a few major software vendors, including WordPerfect and Lotus, have ported their applications to Sun's OpenLook operating system, although more have promised to.

Workstations are grabbing the middle ground

Where workstation sales come from	
Replacing minicomputers	54%
Replacing mainframes	22%
Upgrading from PCs	24%

Source: Prudential Securities

NeXT also suffers from a lack of productivity applications. While it claims applications in the hundreds, only a handful are in the spreadsheet, word processing, and database arenas.

NeXT claims that it has a trump card in the race to woo applications developers–the NeXTstep user interface and development environment. Developing for a graphical user interface is not easy for either custom in-house developers or commercial software vendors. There are a number of UNIX interfaces from which to choose–Sun's OpenLook, HP's NewWave, OSF/Motif and OSF/1, to name a few–and committing to one is a crucial allotment of developer resources. NeXT has addressed this problem by integrating an object-oriented graphical interface with its development environment, which it claims cuts development time dramatically.

NeXT's interface has analysts impressed but still skeptical. "Most of the senior developers for other (computer) companies share the view–whether or not they think NeXT will be successful–that NeXT is the best embodiment [of the next generation of computers]," said Jonathan Seybold, publisher of Seybold publications. "But NeXT has still got one hell of a challenge, starting this with essentially no installed base."

Channels

A company without a large installed base must also convince dealers and value-added resellers (VARs) to sell the machines, no small task considering the training, service, and support involved. NeXT has had its ups and downs with this channel, including a much-trumpeted deal with Businessland that has since fallen flat. "The big question, as we have posed for two years, is how well can they develop a channel to . . . beat out Sun, Apple, IBM, and Compaq," said IDC's McLeod. "Their biggest challenge is clearly getting to a customer base . . . the channels are already flooded."

NeXT asserted earlier this year that it plans to sign up 100 VARS and 100 dealers by year's end–small numbers compared with the number of Sun authorized dealers and VARS, and tiny compared to the established channels developed by large PC makers like IBM, Compaq, and Apple.

For NeXT, it may all come down to getting the word out. "I think NeXT's real problem is getting visibility," said Paul Cubbage, associate director of UNIX systems software services for Dataquest, a San Jose-based market research firm. "As good as Jobs is [at that] . . . the people out there making noise about workstations are IBM, DEC, HP, and Sun, and they have loud voices."

Some analysts like to compare NeXT to Steve Jobs's other start-up company: Apple Computer. Like the first NeXTcube, Apple's Macintosh started as an expensive, slick machine that was ignored by most of the serious computer world. But after several years and significant revisions, Apple's Macintosh now enjoys a respected position in the business environment. Many in the industry say it set the standard by which desktop machines in the 1980s were judged. By redefining itself as the ideal professional workstation, NeXT may have drawn the desktop battle lines for the 1990s.

"I don't think there is anyone in the industry who would contend that anything matches what NeXT has now," Seybold said. "The question is how much does that matter?" ◆

***NeXTWORLD* Extra is a news supplement of *NeXTWORLD* magazine. It is bound into each issue of the quarterly magazine and shipped separately to subscribers in months that the magazine is not published. Lt. Sullivan's column and articles about unannounced NeXT products are reported and written by contributors without guidance from the *NeXTWORLD* staff.**

NeXT realigns marketing team

by DAN RUBY

Redwood City, CA – Shortly after staking out a new position for its products in the professional workstation market, NeXT reorganized its marketing department, placing the group under Vice President of Sales Todd Rulon-Miller and bringing in Microsoft marketing veteran Mike Slade as director.

The company also scaled back its internal creative services team and awarded its marketing communications account to Cleary, Kvamme & Suiter. NeXT's advertising agency, Ammirati & Puris, dropped NeXT as a client, citing a conflict with its Nikon account. NeXT named no new agency.

NeXT has been frequently criticized for lacking a coherent marketing strategy. "NeXT has done a great job of telling the world about its technology but not of communicating whom the technology is for," said Slade.

He said that NeXT would pick two or three application areas, possibly custom development and professional graphics, to emphasize in upcoming [CONTINUED ON PAGE 15]

Market takes off in Europe

by DAN LAVIN

Geneva, Switzerland – The NeXT computer is a big hit in Europe. Following its show-stealing appearance at CeBIT, the large German computer show, last spring, the company has scored sales coups, established distribution channels, and localized the NeXT for use in foreign markets.

According to Theo Wegbrans, president of NeXT Europe, the region will at least triple its first-quarter performance in the second quarter. Given NeXT's announced first quarter sales figures, of which 15 percent came from Europe, this should mean that Europe will account for more than 3500 units in the period from April to June. Wegbrans also estimates that the software and peripheral market in Europe is three-quarters the size of the base hardware market, making a market of $22 million per quarter for NeXT third-party products.

While the United States has only several dozen dealers signed up, Europe has 100 NeXT Centers in place. Each Center commits to making a $1 million investment in setting up a sales, training, and support organization, exclusive of inventory. NeXT Centers also provide value-added services such as custom development.

Wegbrans points to this readiness by dealers to invest heavily in support as a key to NeXT's success in Europe. Because computer makers have traditionally neglected the European market, local dealers developed full support services. When customers moved to workstations, dealers already had a huge investment in the infrastructure to provide the additional services workstation support requires.

On a parallel track, Europeans have embraced UNIX much faster than those in the United States. Their markets have long been dominated by giants like Siemens, Bull, and Philips, which have traditionally sold proprietary, non-compatible operating systems. Many have reacted by turning to UNIX, Wegbrans said.

NeXT has also localized its products for major European markets, having shipped versions for France, Germany, and the United Kingdom in July. The NeXT operating system on every machine includes the capability of switching between languages; the localized versions also include special keyboards, local regulatory approvals, and translated user documentation. ◆

Kanji OS ships

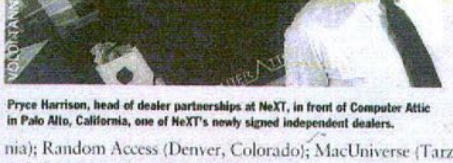
Tokyo – NeXT Japan announced the shipment of NeXTstep 2.0J, a localized version of the NeXT operating system, on June 18. The release optimizes the NeXT for use in Japan with Japanese menus, prompts, and screens. User and technical documentation is also available in Japanese. James Higa, Representative Director of NeXT Japan, said, "Japan is a wide-open market–one of the fastest growing markets for the taking. We did well with an English product, and now that Kanji is here sales are only going up." Any NeXT application that uses the text object will automatically allow the typing of Japanese Kanji characters instead of English by merely selecting a Japanese font. The NeXT system's Display PostScript makes it the only system to allow the use of any size font in Japanese, a key competitive advantage here.

NeXT looks to regional dealers

by LAURA FREDRICKSON

Redwood City, CA – Six months after cancelling its exclusive distribution deal with Businessland, NeXT is actively courting small dealers.

"We haven't signed any chains; it's the regional independents we're looking at," said Pryce Harrison, manager of dealer partnerships at NeXT. The company is targeting smaller dealers because it wants the "value added" rather than the "high-volume, commodity-type product" approach, he explained.



Pryce Harrison, head of dealer partnerships at NeXT, in front of Computer Attic in Palo Alto, California, one of NeXT's newly signed independent dealers.

NeXT severed its relationship with Businessland completely in May. Since the beginning of this year, NeXT has signed up 25 dealers; the goal is 100 by year's end. About NeXT's search for new dealers, Harrison said, "If they're carrying high-end PCs, they're good prospects."

Dealers are also approaching NeXT directly. One is Bruce Waldack, president of Desktop Publishing Center Corporation in Alexandria, Virginia, an independent Macintosh dealer. Two years ago, when he approached NeXT to be a representative, the company brushed him off. Today, Waldack is the only NeXT dealer in the Washington D.C. area.

Other prominent dealers the company has signed include Computer Attic (Palo Alto, California); Random Access (Denver, Colorado); MacUniverse (Tarzana, California); PCSI (New York); and Advantage Computer (Burnaby, British Columbia).

Being the only NeXT dealer in town can be a double-edged sword: although a dealer may get all the business in one area, he must also market to and then service the entire region as well, said John Budakovich, marketing manager of The Data Place, in Lynbrook, New York.

Indeed, some industry watchers question whether NeXT's new direction will generate enough badly needed sales. "It's at the high-volume dealers where they'd get the traffic they need," said Nicholas Baran, who formerly published Baran's Tech Letter. "The public still cannot go out and see a NeXT computer in most parts of the country." ◆

NeXT Ink

by DAN LAVIN

Cabbage Patch Cubes

There's a certain charm to customization. For dolls, it's great if every one is slightly different. But this is less desirable for computers, however–and long-time NeXT users know what I'm talking about.

NeXT has a long history of making small design changes without telling anyone. It started with the faulty SCSI chip that shipped with the first thousand original cubes. NeXT never acknowledged the problem; they just quietly changed the chip. When it became obvious that the cube's cooling system wasn't doing its job well, NeXT changed the design of the air vents and the direction of the fan, but again the company didn't acknowledge the problem or announce the changes.

With no announcement, the '040s began shipping with the universally hated new keyboard–a keyboard actively inconvenient for UNIX developers. There was never any explanation from NeXT, nor did NeXT offer users the old keyboard as an option.

Then came the two most serious in-line surprises. First, the 17-inch color monitor. While the 21-inch is clear and crisp, the 17-inch shipped with serious convergence problems. NeXT is improving the monitors in increments by working with the manufacturers, and in an uncharacteristic step, it announced the problem in a press release from NeXTedge. Unfortunately, pre-release orders were filled with the fuzzy, non-exchangeable monitors.

System 2.1 is another headache. NeXT shipped System 2.0 with some bugs that were swiftly eradicated in System 2.1. Unfortunately, NeXT took the position that 2.1 was primarily to add color support and that the average user did not need to upgrade, despite the fact that all current systems ship with 2.1. The problem is that anyone making serious use of serial ports or trigonometry is likely to encounter the bugs.

It's unclear how many users are affected by the bugs, but NeXT should upgrade all users for free. Instead, it charges for this interim upgrade–not just for materials, but for the license too. That means it's illegal to get a copy from a friend. I say that NeXT should come clean on 2.1 and give it away.

Overall, NeXT does an excellent job of customer service and support. But NeXT could fix a major hole in its corporate policy by stopping the surprises and giving customers a fair way to react. Otherwise, it might as well go all the way with the Cabbage Patch model and package NeXT computers with adoption papers.

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and can generate output files in PICT, TIFF, or PostScript format. Pixar can be reached at 415/236-4000.

Adamation will ship its Live Wire conferencing software for the NeXT in August, the company said. With Live Wire, users can carry on an ongoing dialog and collaborate on shared documents, which can include text, images, and sound. Live Wire will be priced at $195 per node. Adamation can be reached at 415/452-5252.

Maynard Electronics announced that its ArchiveST series of SCSI tape drives are compatible with NeXT computers. Two backup systems are now shipping: a 2GB DDS-format external DAT drive ($4475) and an external 525MB quarter-inch cartridge drive ($1880). For information, call 800/821-8782.

Hard drives: NeXT introduced a 1.4GB Wren 8 with a rated access time of 15ms. It lists for $5995. Micronet Technologies (714/837-6033) began shipping a full line of storage products for the NeXT, including fast disk drives from 300MB to 1.35GB, 40MB and 80MB SyQuest drives, and a 600MB Sony optical system. Prices range from $2445 to $7495. Microtech International (203/468-6223) is shipping its line of Eclipse hard drives, ranging in size from 200MB to 1GB and in price from $1899 to $5399. It also offers a $1399 50MB removable cartridge drive and a fast CD-ROM drive for $1099.

Ensuing Technologies (Las Vegas) said it would ship a subset of its Papyrus forms-design software by September. The initial module will include predefined forms for general office functions, including phone messages and intercompany announcements. The module will be priced at around $150. The full program, with tools for laying out custom fórms, will follow later this year.

Coda Music Software will not be developing its MusicProse software for the NeXT after all. The Bloomington, Minnesota, company announced a NeXT version of its music notation editor last September, but now says that it will concentrate on its Macintosh and Microsoft Windows offerings.

NETware

[CONTINUED FROM PAGE 12]

"It will save a lot in setup and maintenance time and may provide a speed boost," said Kosiur.

Both Kosiur and Wells agree that NeXT computers are unlikely to be used as NetWare servers. "I think NeXT has a lot of advantages meant more for the client, none of which would show up on the server side," said Kosiur.

Wells hinted that support for Microsoft's LAN Manager and other network systems may be forthcoming. "We are definitely looking at all the big-name LAN vendors, but everything is very preliminary," he said.

The move to support NetWare and AppleShare is part of a larger strategy to make NeXT more attractive to corporate buyers. "We've had a bad rap for being a non-open company, but this puts us out in the lead in terms of having an open networking system," said Wells. "We will certainly be the first UNIX workstation to bundle this stuff, and the first to have a such a nicely integrated solution."

NeXTedge

[CONTINUED FROM PAGE 12]

California–with more planned–to conduct classes such as "An Introduction to Interpersonal Computing" and "Building a NeXT Network." A two-day end-user workshop costs $350. NeXT staff members currently teach all the classes, but third-party providers may also be certified as the program grows.

Resellers and users alike will be able to purchase Next Day, NeXT's on-site extended warranty, for approximately eight percent of the equipment list price. Next Day promises "next business day on-site response." For a seperate fee, NeXTedge will also provide initial equipment setup.

Software support consists of several parts: the Technical Support Hotline, a more focused system of phone support than that which has been in place for the past three years, is an annual subscription service available via telephone and electronic mail. Qualified customers and resellers can tap in for $2500 a year.

In June, NeXT added "The Support Bulletin." Offered on-line and in print, this regularly published update covers hardware and software concerns and offers technical tips. Authorized service and support centers receive the publication free of charge; users pay an annual fee of $120.

The third subscription service is "NeXTanswers," a software library of answers to commonly asked technical questions, presented in a Q&A format on floppy or optical disks for $120 annually. It is also freely available from the NeXT Internet archive servers.

For more information about NeXTedge or any of the services, contact Trish Conlon at NeXT (800/848-6398).

Marketing

[CONTINUED FROM PAGE 14]

marketing campaigns. Instead of spending on advertising, NeXT will favor programs like seminars and road shows that "get the product in front of people," said Slade.

CKS principal Tom Suiter was creative director at Apple Computer when NeXT Chief Executive Officer Steve Jobs was Apple's chairman. The company will produce new packaging, collateral, sales promotion, and other materials for NeXT.

C-Cube

[CONTINUED FROM PAGE 12]

compression standard.

Criticizing the computer industry for providing "crummy" video for ten times the cost of a relatively high-quality $300 VCR, Jobs said the industry should take the lead in developing a "CD player on steroids," which would play both sound and real-time video. The computer and consumer electronics industry should work together on MPEG, said Jobs. C-Cube demonstrated a prototype MPEG chip at the conference.

Instead of using C-Cube's JPEG chip, NeXT equipped the NeXTdimension with a generic connector for future add-on compression boards. Although C-Cube acknowledges that it "missed the window of opportunity with NeXT," the company hopes that NeXT will consider it in the future, according to Mauro Bonomi, C-Cube's director of marketing.

Meat and (cold) potatoes for Lt. Sullivan

As Lt. Sullivan put his lunch tray down on the cafeteria table, he scanned the room, easily separating the field operatives from his fellow desk jockeys. For the thousandth time he considered whether you could actually do more to change the world from out in the field or from an office, as he had been trying to do for the past six years. The mashed potatoes were cold again.

He ignored the potatoes and mentally sorted through the reports that had come in from the Agency's intelligence network, wondering what he'd have to do to save NeXT's marketing bacon this time. He hated reading those business magazine articles saying that the technology was great but had missed its market window. Clearly, the reporters hadn't ever spent quality time with the machine. What could he do? He certainly couldn't let them into the secure walls of the Agency to tour the rows of sleek black workstations keeping everyone connected and productive.

★

Now here was an interesting rumor, thought Lt. Sullivan, leafing through his report.

Seems that Sun Microsystems had picked up a copy of NeXT's Fall 1990 *Software and Peripherals* Catalog and let their fingers do the walking. After all, why should all this nice software run only on black computers? In the course of its hunt, Sun had come across a couple of unhappy NeXT developers, and the Sun platform has benefitted from NeXT's gaffes.

CUBE CONFIDENTIAL

One fumbled product was FutureShock, a HyperCard-like authoring system that includes an object language called FutureTalk and runs most HyperCard 1.x stacks on the NeXT without modification. The product was strong, but the user interface hadn't done much for Steve's sense of aesthetics, and he'd said so. The package is now being developed for the Sun. Fortunately, another player who had seemed to be dropping the ball on a HyperCard work-alike had brought in some fresh talent, and H^3 is back on the road to shipment.

Lt. Sullivan grinned as he reread the next missive. Now that Adobe has finished Illustrator 3.0 for the NeXT, the real gem in the collection may be in progress–a quietly developing PhotoShop. It should be out next year. What should come sooner is Stealth, the "Illustrator-killer" those hombres out in Texas are cooking up. The agreement with Aldus says they can't call it "FreeHand," so the good ol' boys are briskly pouring through Digital Webster for something fresh.

Pages Corporation is quietly working in San Diego on the next generation of page layout software. PageOne was shown at Seybold last spring, but no one has yet seen PageTwo–the piece that controls style guidelines and parameters for the environment. The duo is designed to scratch the itch of those corporate customers who paid big money to a design firm to create a corporate look only to watch desktop publishers in their organizations crank out garbage on corporate letterhead.

The latest secret at Pages is its negotiation with Ashton-Tate to acquire the rights to PowerStep, reshape it to look more as the principal architect originally envisioned, and release it as a possible presentation, charting, and graphing partner for Page One.

★

With third-party development on the fast track, Lt. Sullivan's attention turned to what was going on inside NeXT. He recently enjoyed one of NeXT's warehouse parties, where the Sierra Nevada Pale Ale flowed freely and the information seeped out slowly.

It was looking like a fourth quarter 1991 announcement and a second quarter 1991 ship date for NeXTstep 3.0 and a new model of NeXT machine. NeXTstep 3.0 will beat several other computer manufacturers to the punch with fully implemented symmetrical RISC-based multi-processing. Currently, the fad seems to be to put multiple processors on the motherboard, use them for a few selected processes in your OS only, and call that multi-processing. NeXT has something much more comprehensive in mind.

Watch for support in NeXTstep 3.0 for handling several sorts of telecom tasks and other fun things. Best of all, System 3.0 won't be anywhere near as slow in coming as Apple's System 7.0 was. Now if NeXT could only learn that lesson about font installation that their cousins finally learned after seven years . . .

The NeXT portable? Now that users have had a couple of years to become very attached to MegaPixel displays, NeXT is not going to be able to foist some optical disk-sized display on us and call it a tool for the real world. But since larger displays are not only big and heavy but also require big and heavy power supplies, major breakthroughs in display and power technology will be needed to make a portable suitable for the NeXT platform. Development is underway, technology notwithstanding.

If you have any hot tips, quietly e-mail me and I will slip you a hard-to-acquire NeXTWORLD *T-shirt. I managed to sneak a few to Steve for his personal signature, but the supply is limited, so speak up quickly. I pick up e-mail at Sullivan@nextworld.com and voicemail at 415/978-3189. Don't call the Agency. They don't know I'm doing this.*

ADOBE PRESENTS THE MOST POWERFUL ILLUSTRATOR EVER SEEN.

Adobe Illustrator® has already proven its talents on hundreds of thousands of desktops the world over. Now Adobe unleashes its power in the industry's richest graphical environment: Presenting Adobe Illustrator for NeXT™ computers.

Taking advantage of features unique to NeXT computers, it streamlines the whole process of page design.

One of the first things you'll notice in the NeXT version of Adobe Illustrator is that things happen almost instantly. When you reposition an image on your page for example, it appears right away–no waiting for the screen to "refresh." Zooming in and out is every bit as quick.

You can drag-and-drop EPS and even TIFF files into your document and they are displayed as actual art. There's no need to work with placeholders instead.

And with the NeXT version of Adobe Illustrator, preview mode is not strictly for looking. You can actually edit your work there, saving even more time.

This version of Adobe Illustrator offers all the advances Adobe has made on other platforms, including tools for font editing and text effects. It also offers new features, such as customized grids and sophisticated autotracing for color files.

The result is a complete design package, with a full selection of high-end tools for creating both graphics and text.

In all modesty, we'd have to say there's never been a program that can take you from concept to final color separation with this kind of speed and confidence.

But then, who better to create the most advanced program for the pure PostScript® world of NeXT, than the company that created PostScript in the first place.

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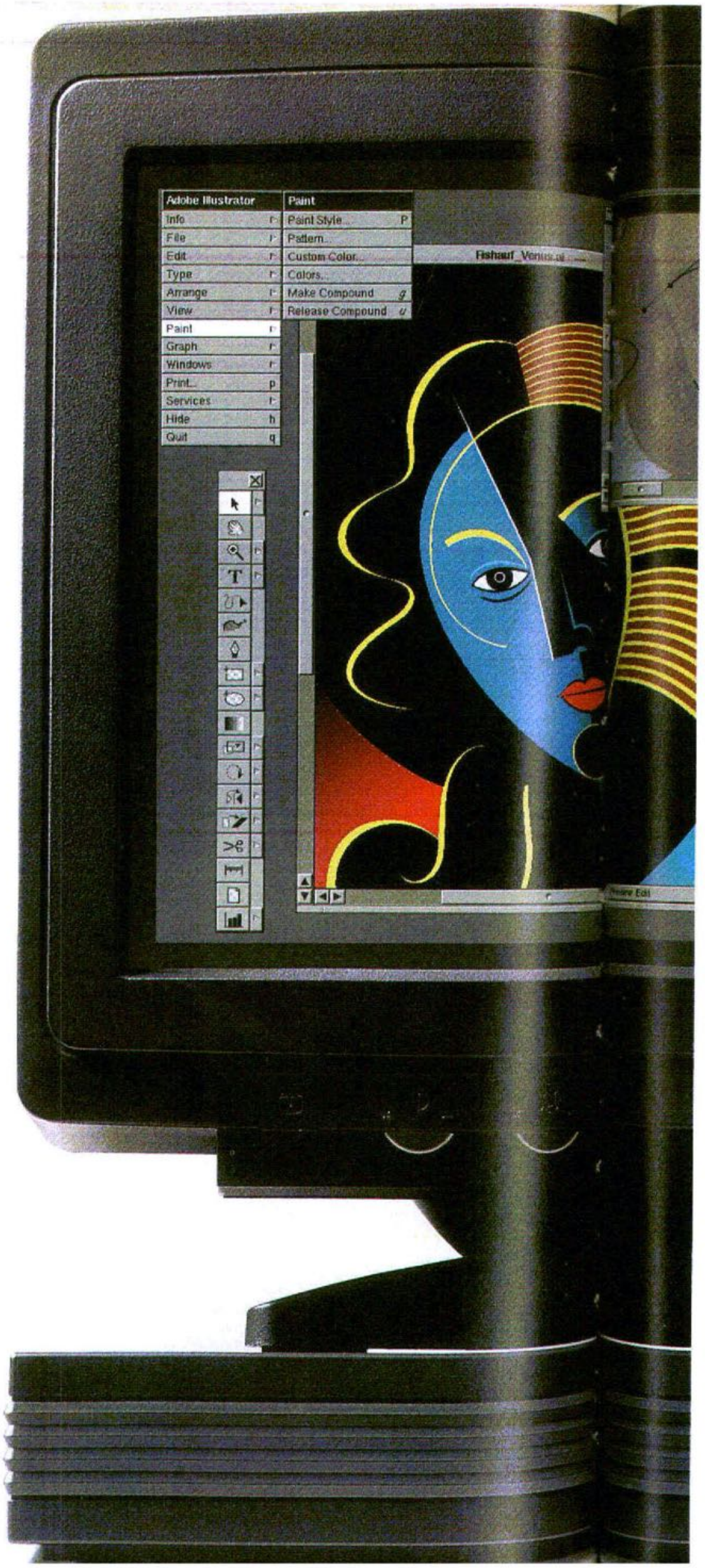
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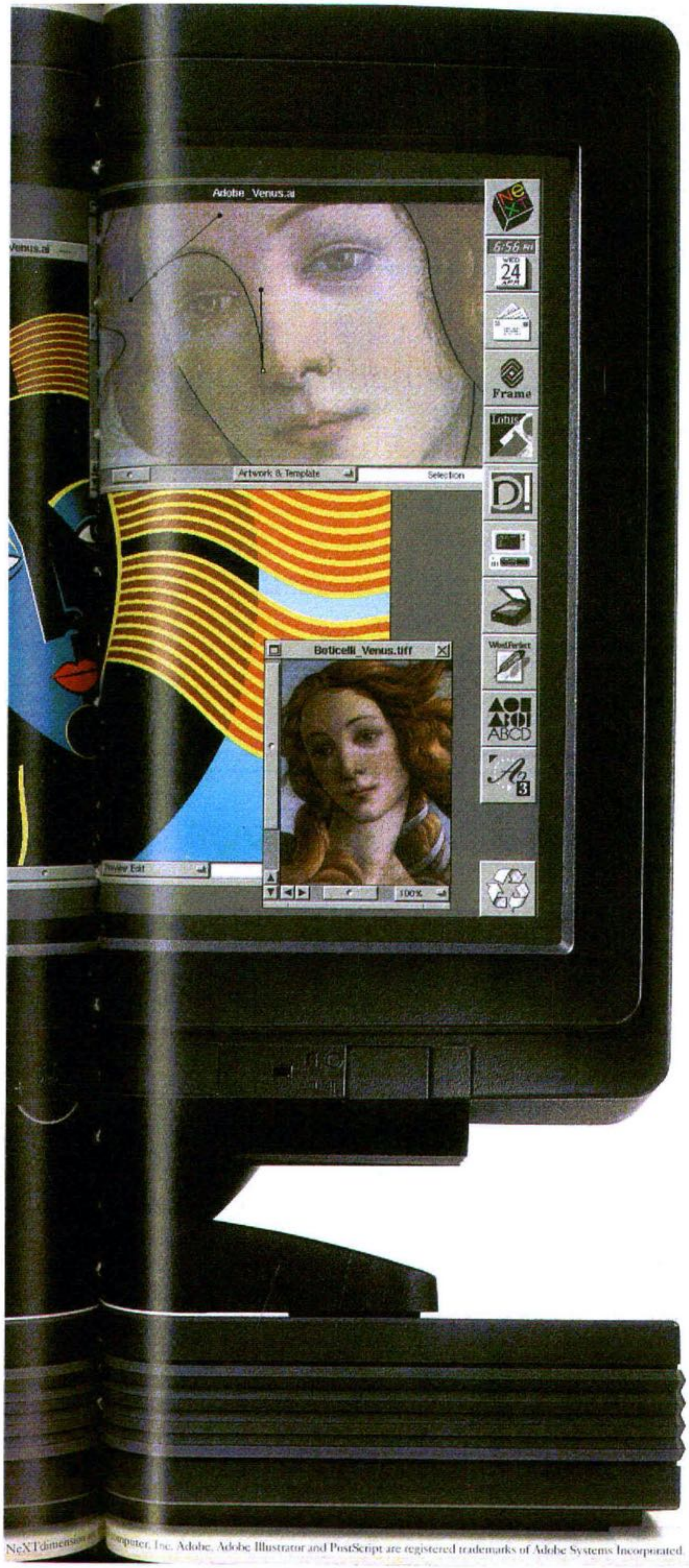

NeXTdimension ... Computer, Inc. Adobe, Adobe Illustrator and PostScript are registered trademarks of Adobe Systems Incorporated.

Only one computer makes it possible for Adobe Illustrator to offer such powerful design tools, and display work in such fine detail: The NeXTstation™ computer.

It's designed to take you to a far higher level of perfomance, and still be perfectly simple to use.

At its heart lies Motorola's warp-speed 040 chip, so even complicated pages can be manipulated without delay.

And, unlike most desktop computers, the NeXTstation uses one unified system–

NeXT PRESENTS THE ONLY PLACE YOU'LL SEE IT.

Postscript–to generate every image you see on screen and on paper.

That means you get true "WYSIWYG." It also means Adobe Illustrator can finally flex its muscle in a pure PostScript world. Which is why artwork can be so rapidly moved, edited and zoomed.

Image quality is unprecedented as well. The MegaPixel Display gives you a very large workspace and a level of detail you haven't seen on a computer before. (Add 4,096 colors if you go the NeXTstation Color route. And, if you insist, 16 million more with NeXTdimension™: the world's only true 32-bit color PostScript system for photographic image quality.)

And because it's a genuine multitasking machine, a NeXT computer allows you to have all your applications open and linked without any performance degradation.

Even the most basic NeXTstation is amply equipped for programs as advanced as Adobe Illustrator. Starting at $4995, you get 8MB of memory (expandable to 32), a 2.88MB floppy and 105MB hard disk–with an option for the 400MB variety.

For your free copy of our NeXTstation brochure, call us at 1-800-848-NeXT. You'll discover that in the world of NeXT, software is more than powerful. It can be positively eye-opening.

Circle 12 on reader service card

SPECIAL REPORT

NeXT aimed somewhere over the rainbow when it entered the realm of color this spring with the delivery of its NeXTstation Color and NeXTdimension systems. Although it trailed other workstation manufacturers into the color market, NeXT's color hardware and system software are implemented with unique features and characteristic NeXT style.

Plunging

But design specs are one thing; tangible user benefits are another. To find out whether NeXT's implementation is truly a horse of a different color, this special report looks at NeXT color hardware, software, and applications through the prism of the user experience.

The three-part package is based on extensive hands-on experience with the new machines. Contributing Editor Don Crabb put the systems through the paces at his University of Chicago lab. Desktop publishing pundits Tony Bove and Cheryl Rhodes cast their critical eyes on Adobe Illustrator for NeXT, the most ambitious color application software currently available. And Senior Editor Dan Lavin examined the options for connecting color scanners, printers, and other peripherals to the NeXT boxes.

The bottom line: The NeXT systems hold great promise to redefine both the features/benefits and price/performance curves for color computing. But more support from third parties is needed before users will find a pot of gold at the end of NeXT's rainbow.

PRIMARY COLOR

BY DON CRABB

NeXT's double-barreled entry into color combines innovation and affordability.

With the recent shipment of its NeXTstation Color and NeXTdimension systems, NeXT has entered the color market as it has every arena–doing things its own way.

For those accustomed to the market-leading 8-bit and 24-bit color systems from Apple and Sun, NeXT's redefinition of the low and high ends of the market as 16 and 32 bits of color comes as a revelation. So does NeXT's superb implementation of the alpha channel to convey transparency information, and the machine's elegant interface tools for managing color.

All of this comes at highly aggressive prices–about $8000 for the 16-bit NeXTstation and about $15,000 for a NeXTcube with the 32-bit NeXTdimension board. In my tests of some of the first shipping units of the two systems, I found that they lived up to most of their prerelease hype. There is no better value for serious color computing on the market today.

The only disappointment is that NeXTdimension shipped without JPEG (Joint Photographic Experts Group) compresson built into the hardware, so it can't handle real-time video-to-disk. The other limitation is a familiar one: the relative paucity of color-capable software that can take advantage of the new hardware.

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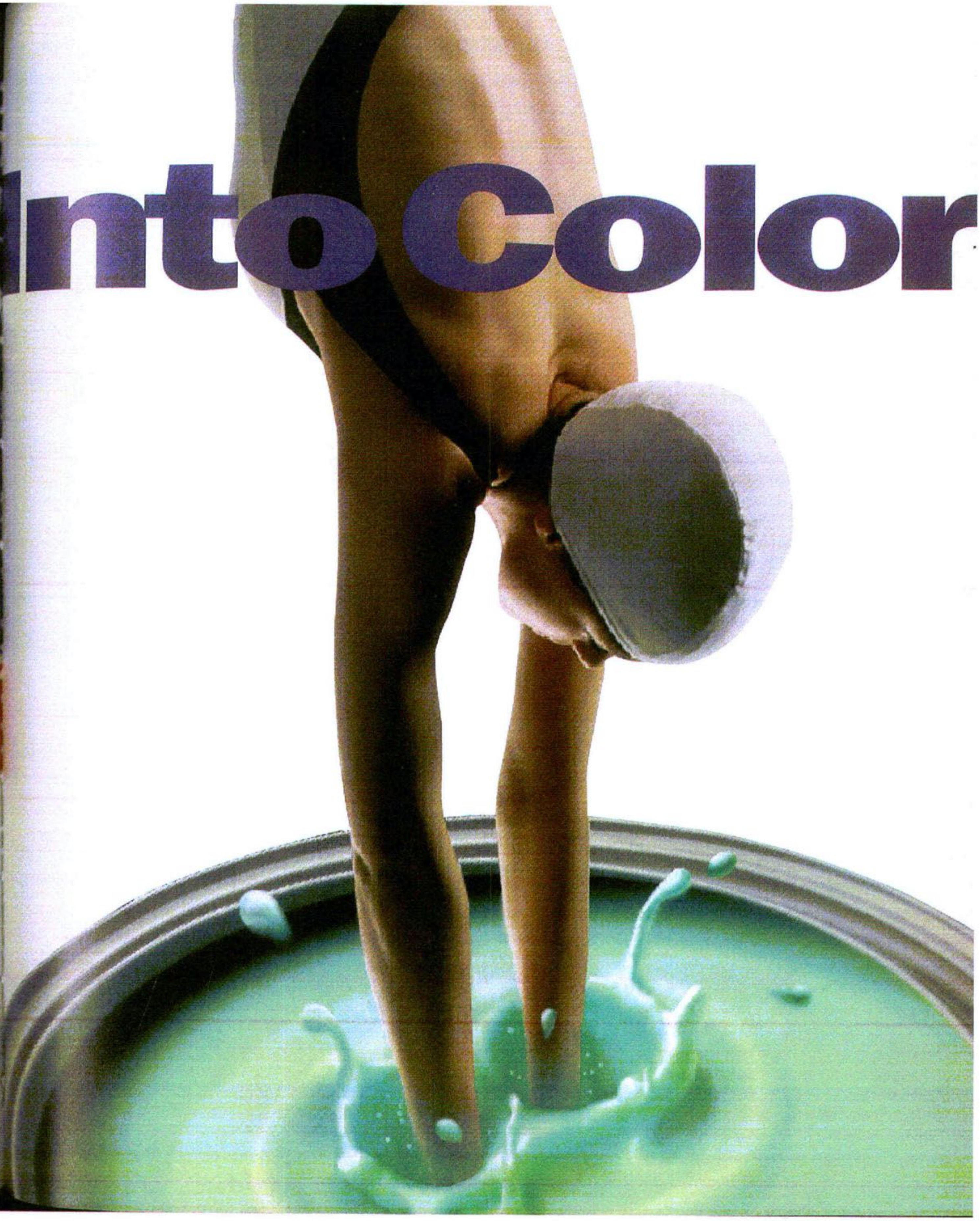

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Seamless integration

As developers and buyers take note of NeXT's innovations, software is sure to come. The NeXTstation Color and NeXTdimension support a superb color-imaging model that should make it a snap for third parties to create some spectacular, powerful applications. The unified PostScript imaging model springs into color effortlessly; the same Display PostScript code that drives a monochrome display simply works in color on the NeXT color display, ensuring effortless compatibility of files between color and non-color NeXT workstations.

The NeXT implementation of Display PostScript is painstakingly true to Adobe's PostScript standard, so current and future NeXT customers don't have to worry about going through the imaging model transitions that Apple's customers are now going through with the changeover from the QuickDraw/Post Script model to the TrueType/QuickDraw/PostScript melange.

Perhaps the most impressive feature of NeXT's color is how it is integrated into the user interface. NeXTstep 2.0's well-thought-out support for color can be seen in such features as its Colors panel and color wells (see the sidebar "Color à la Mode"), which make using the system uniquely intuitive.

One thing you don't see in the interface is indiscriminate use of meaningless color. According to Keith Ohlfs, interface guru at NeXT, NeXT doesn't want to see the "purple menus and pink windows" that have shown up on other systems that add color. The 2-bit gray-scale interface (in contrast with other machines' single-bit black-and-white) provides sufficient definition within the basic NeXT interface as well as an effective background for color information that appears in windows. Application icons use color only if the application has color capabilities.

Added to NeXT's base machine, any type of color would make the NeXT an appealing choice for the large number of users who simply prefer color in the interface. Even if you only use the Improv spreadsheet and the WordPerfect word processor, using them in color brings their functionality to life. And color is necessary for some applications, such as publishing, graphics, and engineering and related scientific work. Trying to get the same level of performance out of a SPARCstation, a Mac, or a machine from IBM or HP/Apollo would involve shelling out many thousands more and result in a less-integrated solution (see the sidebar "Color Systems Compared").

What do you get with 16 bits?

The NeXTstation Color redefines the standard for low-end color–16 bits, as opposed to the 8 bits of competing systems. Actually, only 12 bits are used to describe color (4 bits each for red, green, and blue, permitting up to 4096 colors, rather than the 256 colors of 8-bit systems). The other 4 bits are reserved for the alpha channel, which contains information about pixel transparency.

Alpha itself is not new (see the sidebar "Alpha Bits"), but NeXT's use of it is the first coherent, system-level implementation in a modestly priced graphics system. The alpha channel information adds a dimension of realism not available on any other system. I found it especially helpful for combining images with see-through elements.

As for color fidelity, the 16-bit system yields greater depth and realism to images on a NeXTstation Color than the equivalent images on an 8-bit system. When

Alpha Bits

The alpha channel had its genesis in a 1984 paper by Thomas Porter and Tom Duff (then of Adobe, now at Pixar). Now, it's what makes color on the NeXT different from color on any other computer graphics system commonly available.

While most high-end computer graphics systems store three values for every pixel (red, green, and blue), NeXT systems store a fourth: the alpha value, which defines how transparent an object is. Every pixel includes an alpha component.

The idea of alpha is to make color images act real when they are manipulated. Let's say you have a bitmap of a Ferrari. You can't see through the body of the Ferrari (those pixels have an alpha value of 1.0), but the tinted windows might have an alpha of 0.7; that is, they are somewhat transparent. And wherever there is no car in the bitmap, under the tires or over the hood, the bitmap would be completely transparent, or clear, with an alpha of 0.0.

The use of alpha becomes clear when you paste this bitmap of the Ferrari onto a picture of a street: you see the background partially through the windows, but it's not as clear as the background over the car's hood.

Alpha also adds realism to the NeXTstep user interface. For example, some of the pixels in the WriteNow icon are transparent, so that when you drag a file icon into a folder, you can see the folder opening underneath.

The pixels get their alpha values in a number of different ways. Ideally, scanner software and rendering programs would attach alpha values to each pixel as it is created. Renderman is the first program to offer that type of sophisticated support. NeXT's Colors panel (see the sidebar "Color à la Mode") provides controls for opacity in several of its color modes, enabling users to add opacity specifications to any color. TopDraw, on the other hand, uses alpha only in the user interface. The user can assign alpha values to objects, which helps when placing those objects in complex constructions, but the image loses the transparency information when it's printed. Illustrator doesn't support alpha editing at all.

Most NeXT graphics-handling software (such as the developer demos Grab, Scene, and Icon) can save TIFF files with or without alpha information (saving a TIFF file with alpha increases its size substantially). Since the alpha channel is unique to NeXT, the alpha information can cause some problems when exporting NeXT color files to non-NeXT software. Programs that save files in EPS (Encapsulated Post Script) format, such as Adobe Illustrator, should have no problem. Most such programs omit any Display PostScript information– including alpha–when creating EPS.

For display, the alpha channel has the same device independence as any other PostScript information: any NeXT computer can display an image with 0, 2, 4, or 8 bits of alpha. A monochrome NeXT displays 2 bits of alpha; the NeXTstation Color, 4 bits; and the NeXTdimension, 8 bits.

SIMSON L. GARFINKEL

Color Systems Compared

Although IBM and HP/Apollo make good UNIX workstations, neither of them has done much yet for providing strong color support for their users. Assuming that you need a color station at a fairly reasonable price, the leading competitors to NeXT are the Sun SPARCstation 2 and the Apple Macintosh IIfx running A/UX, Apple's UNIX.

The Macintosh's abundant applications and great GUI make it strong competition. Any well-behaved application that runs under Apple's System 7.0 can also run under A/UX (although System 7.0 itself won't yet). But, as shown in this chart, piecing together a Macintosh system to rival the NeXTdimension takes some third-party hardware and upwards of $18,000. If you want to run A/UX, add another $1700 for A/UX on CD-ROM and a CD-ROM player.

Sun still lacks the support from third-party vendors that a company with their giant lead in workstations ought to have (probably because they only settled on their OpenLook GUI recently, having previously courted two other GUI systems). But they have started to attract Lotus and other important developers. Sun makes solid hardware, and its networking software sets the standards by which the other workstation vendors live (they invented the Networked File System). The Sun GUI (OpenLook 2) is a good one, though not as easy to use as NeXTstep. OpenLook can support 8- and 24-bit color, without an alpha channel. And with all Sun's strengths in networking, it hasn't yet reached the ease of installation that NeXT's system administration tools provide.

This chart shows equipment and price specifications of the NeXTcolor stations and roughly comparable systems from competing vendors. Note that the systems are not exact, but the closest that can be assembled with competing hardware. We've chosen a top-of-the-line monitor for the NeXTdimension and comparable systems.

	NeXTstation Color	NeXTdimension	Macintosh IIfx		Sun SPARCstation 2	
			–NeXTstation Color	–NeXTdimension	–NeXTstation Color	–NeXTdimension
List price[1]	$7995 (Includes 17-inch MegaPixel Color Display)	$7995 for NeXTcube $3995 NeXTdimension board $2995 21-inch MegaPixel Color Display	$8669 for CPU $1999 for Apple 8•24 GC Color Card $999 for 13-inch Apple color display $89 for monitor stand	$8669 for CPU $3999 for a SuperMac Spectrum/24 PDQ Color Card $4400 for SuperMac 21-inch monitor $2195 for a Radius TV card (real-time video)	$19,995 (includes 19-inch color display and 8-bit accelerated color)	$26,995 (includes 19-inch color display and 24-bit accelerated color)
Total	$7995	$14,985	$11,756	$19,263	$19,995	$26,995
Colors	12-bit plus 4-bit alpha	24-bit plus 8-bit alpha	8-bit	24-bit	8-bit	24-bit
Processors	25MHz 68040 CPU 56001 DSP Integrated Channel Processor	25MHz 68040 CPU 56001 DSP Integrated Channel Processor Intel i860 33MHz RISC graphics processor with 8MB (expandable to 32MB) frame-buffer RAM	40MHz 68030 CPU, 32KB write-through external cache Apple sound chip Two serial I/O processors 40MHz 68882 FPU		40HMz SPARC CPU, 64KB write-through external cache 40MHz SPARC FPU SPARC sound processing	
Memory	12MB RAM (expandable to 32MB) 1.5MB DSP static RAM, expandable to 576KB	12MB (expandable to 96MB)[2] 4MB VRAM 24KB DSP static RAM, expandable to 576KBKB	4MB RAM (expandable to 32MB) 1MB VRAM 512K ROM		16MB RAM (expandable to 32MB); color framebuffer	
Network Interface	Etherent (thin or 10Base-T)	Ethernet (thin or 10Base-T)	LocalTalk AppleTalk		Ethernet (thick or 10Base-T)	
DMA Support	Multiple channels, built in	Multiple channels, built in	SCSI only		Multiple channels, built in	
Storage	3.5-inch 2.88MB floppy drive 105MB hard disk	3.5-inch 2.88MB floppy drive 105MB hard disk	3.5-inch 1.44MB floppy drive 160MB hard disk		3.5-inch 1.44MB floppy drive 207MB hard disk	
I/O	Thin Ethernet Twisted-pair Ethernet SCSI/2 Two RS-423 serial ports Laser printer port DSP port MegaPixel Color Display port	Thin Ethernet Twisted-pair Ethernet SCSI/2 Two RS-423 serial ports Laser printer port DSP port MegaPixel Display port Three NeXTbus slots (one occupied by the NeXT dimension board	AppleTalk Two Apple Desktop Bus ports SCSI port Two RS-422 serial ports Microphone port Color monitor port[3] Six Nubus slots (one occupied by the color monitor board)		Thick Ethernet Twisted-pair Ethernet SCSI/2 Two RS-423 serial ports Mono minijack output Color monitor port Three 20MHz Sbus slots(two occupied by the color monitor board for 8-bit system; three occupied for 24-bit)	
Other HW	Keyboard Sound Box[4] Mouse	Keyboard Sound Box[4] Mouse	Keyboard Built-in speaker Mouse		Keyboard Built-in speaker Mouse	
Software	NeXTstep Release 2.1 and bundled applications[5]	NeXTstep Release 2.1 and bundled applications[5]	System 7.0 and bundled applications[5]		SunOS 4.11 w/OpenLook 2 and bundled UNIX and OpenLook applications[5,6]	

[1] List prices were latest at press time; Sun heavily discounts its prices, so list prices can be somewhat misleading.
[2] 8MB (expandable to 64MB) on motherboard, 4MB (expandable to 32MB) on NeXTdimension board.
[3] Multiple displays supported via multiple display cards.
[4] The NeXT Sound Box includes stereo in/out jacks, video/RGB interface, built-in microphone, and mono speaker.
[5] The NeXT and Sun systems include UNIX support tools including text and graphics editors, and shell tools. NeXT includes Interface Builder, WriteNow, Digital Librarian, Digital Webster, system administration tools, and demonstration programs. Macintosh systems include system utilities and HyperCard.
[6] Older SunWindows and NeWS GUIs are also available.

you see the slick charts displayed with Wingz 1.1 or the illustrations produced with TopDraw or Illustrator, 16-bit looks sharp indeed. And the dithering technique used by NeXTstep Release 2.0 will let you view 32-bit images from the NeXTdimension without losing much color detail or authenticity.

What's really impressive is that 16-bit color doesn't come at the cost of performance, as it does on a 24-bit color Mac or a large-format RGB display with 8-bit dithered color. I expected to see the whole thing grind to a halt when I opened several applications at the same time, but it didn't. I did manage to throw a wrench into its color performance, but only by simultaneously doing a number of stupid things–like running a beta version of Mathematica 2.0 while also running a beta of Illustrator 3.0, and then trying to use TopDraw. But that same thing would be true on competing workstations–if you could run those apps on them.

The NeXTstation Color has essentially the same hardware as the black-and-white NeXTstation, with a color display and 12MB (rather than 8MB) minimum memory. Of course, a large part of the NeXT color story is in the specs of the basic NeXT platform.

NeXT's facilities for exchanging large files–key for color work–are strong. Both of NeXT's base storage media, the 2.88MB floppy and optional 256MB optical disks, raise the standard for built-in handling of graphics files. For networking, the NeXT's built-in Ethernet support supplies the necessary bandwidth for transporting color files within workgroups. The NeXT networking system is the equal of the Ethernet that Sun, DEC, and IBM (RS6000 series) provide. Yet it's almost as plug-and-play as Apple's LocalTalk, and for a UNIX network, that's pretty impressive.

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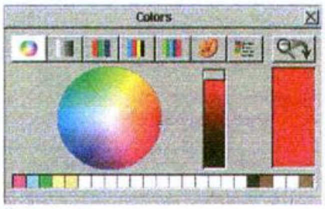
Color à la Mode

NeXT's color systems are set apart by the system-level features that unify how color is handled by every application (at least, every application that follows NeXT's interface guidelines). The most striking example of this is the NeXT system for choosing colors, which consists of the Colors panel and application color wells. Together they provide a single model for picking colors in any application and enable users to create custom palettes that are available in any application and to any member of a workgroup.

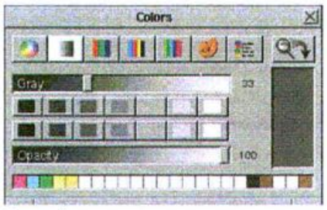
NeXT's Colors panel is a tool for creating, storing, and moving colors between applications. The ready-made Colors panel is provided in the developer's AppKit, ready for any developer to drop into an application. Once installed, it shows up in an application's menus as the command Colors. . .. When the user chooses that option, the standard panel pops up.

The Colors panel provides seven different ways to specify a color. The chosen color appears in the color well on the right side of the Colors panel, ready to be grabbed from there and dropped into an image in the application or stored as part of a custom palette in the grid of color wells at the bottom of the panel. In any mode, you can drag within the color selector or use sliders to see the color change interactively in the color well.



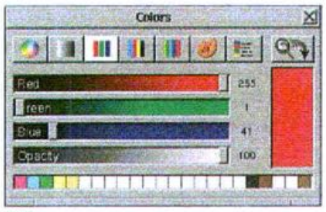
Color wheel

You select a color with the color wheel by clicking the mouse on any part of the wheel. Colors change in hue as you move around the wheel and get more saturated as you move from the center to the edges. Once you've chosen a color, you can move the slider to the wheel's right to make the color darker (add black).



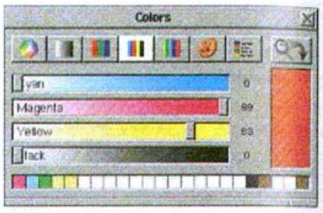
Grayscale

The second Colors panel mode lets you choose among shades of gray. This mode provides two sliders: one to specify the shade of gray, the other to select opacity. A set of buttons between the two sliders lets you choose from a variety of grayscale presets.



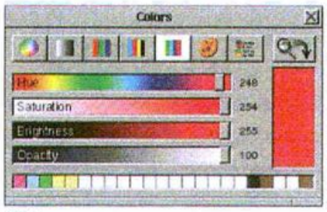
RGB

You specify RGB colors with a slider for each color (red, green, and blue) and a fourth for opacity. RGB is the model used to display colors on color monitors and is a common model in use for color graphics.



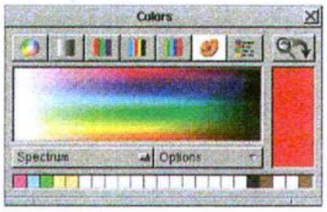
CMYK

Publication designers would likely use the CMYK (cyan, magenta, yellow, black) mode, which specifies colors according to the system used by commercial printers. The CMYK mode of the Colors panel provides sliders for specifying amounts of each "ink."



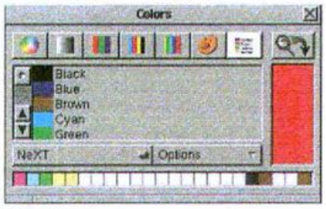
HSB

HSB (hue, saturation, and brightness) is a color model commonly used for video work. The HSB mode in the Colors panel works like a combination of the color wheel and the RGB sliders. Of the four sliders, one controls hue (the position on the wheel), the second controls saturation (the distance from the wheel's center), the third controls brightness (the amount of black added to the color), and the fourth, opacity.



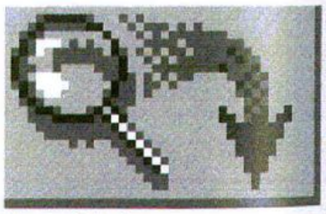
Custom palette

This mode displays a spectrum. As in the color wheel, you pick a color simply by clicking on part of the image. The difference is found in the pull-down Options menu: by choosing New or Open, you can place any TIFF file into the palette, enabling you to pick colors directly from that image. A pop-up menu lets you select among installed images.



Color list

The last mode provides a named list of colors. The basic list gives you black, blue, brown, cyan, green, magenta, orange, purple, red, and yellow. You can also create your own colors and install them there–especially useful if you're doing work with custom color inks (such as Pantone colors).



The magnifying glass

Clicking on the last button of the Colors panel produces a magnifying glass, which you can drag around the screen to pick up a color from any image displayed on the screen. When you grab a color with the magnifying glass, the color appears in the color well, and the controllers of the mode you're in automatically adjust to show the corresponding value of the color you've chosen.

Once colors are selected in the Colors panel, they can be dragged into any application by simply clicking on a color well in the Colors panel and dragging the color into a window on the screen or into another color well in an application. (When you drag a color, a little quarter-inch square of color follows the pointer on the screen.)

The Colors panel is impressive for its comprehensive, unifying approach to different color models. Its weaknesses reflect the current state of color technology. It unifies display colors, but that still leaves a big gap between colors you choose and colors that print. According to NeXT's Keith Ohlfs, designer of the Colors panel, the panel will include new technologies that will address the problem, such as the Calibrated RGB and CIE models, once they are adapted in PostScript Level II.

SIMSON L. GARFINKEL

[CONTINUED FROM PAGE 21]

The main criticism of NeXT's 16-bit color is that you can't get it by upgrading your NeXTcube or black-and-white NeXTstation. That's a serious gap in NeXT's customer service plan and blocks out a lot of potential customers.

For new buyers, though, the NeXTstation Color should be a strong contender for basic publishing, graphics, engineering, and everyday business work. If NeXT succeeds in getting its third-party developers to start cranking out applications, it could cut deeply into the other vendors' basic color markets.

Going upscale

The NeXTdimension system is a 68040 NeXTcube with a NeXTdimension board and the MegaPixel Color Display. Like the old Cube, the new one includes three NeXTbus slots, with various floppy, hard disk, and optical disk storage options. The NeXTdimension board plugs into one of the NeXTbus slots. You can turn any NeXTcube into a NeXTdimension with the addition of the board and the new display (if you have an '030 Cube, you also need the '040 upgrade).

The NeXTdimension board includes its own Intel i860 dedicated RISC processor running at 33MHz for graphics, 8MB to 32MB of main memory, and 4MB of display RAM. Its 32-bit color includes 8 bits of alpha channel and 24 bits of color descriptor (8 bits each for red, green, and blue), for a possible 16.7 million colors.

This level of color and resolution is ideal for graphic artists doing color pasteup work on the screen, or engineers working with very detailed, three-dimensional CAD drawings (or it will be, when CAD and other applications arrive). The NeXTdimension color display and imaging performance (as fast or faster than 2-bit monochrome) is about as good as you can get without spending a hefty five figures.

When announced last fall, one of the most exciting features of NeXTdimension was its built-in C-Cube image compression processor, which would enable real-time video-to-disk using JPEG. Unfortunately, design and manufacturing problems by C-Cube forced NeXT to ship the NeXTdimension, without this important capability. (Subsequently, C-Cube announced that the problems were solved and the chip would ship.) JPEG is provided only in software, which limits video performance to a maximum of about 15 frames per second.

At press time, NeXT had not decided how–or if–the hardware JPEG capability would eventually be provided and whether current NeXTdimension purchasers would get it later as a free upgrade. Current NeXTdimension boards ship with a connector that will allow a daughterboard with JPEG (or even the more efficient MPEG) hardware to piggyback on top.

Even without the JPEG chip, NeXTdimension still offers impressive video capabilities–S-Video inputs and outputs along with RCA-style composite video jacks that let you hook up and control external videodisc players, VCRs, still-video cameras, or camcorders. These video capabilities, in combination with NeXT's CD-quality sound, make the NeXTdimension a natural for multimedia work.

The NeXTdimension display refreshes at least as quickly as a monochrome display does. Connecting a laserdisc player or SVHS-C camcorder and displaying the image in real time in one window doesn't slow down other windows on the screen. If I could figure how to get my cable TV hookup to work with the NeXTdimension, I might never leave my office. The color rendering is that sharp and fast.

New displays

Both new color stations use the same monitor, the MegaPixel Color Display, which comes in 17-inch and 21-inch versions. Both sizes have the same 68MHz non-interlaced refresh rate of the monochrome display, along with its sharp, 92-pixel-per-inch resolution. The 21-inch MegaPixel Color Display offers 20 inches of viewable surface, with a slightly larger dot pitch (0.28mm compared to the 17-incher's 0.26mm). The overall resolution, though, remains the same at 1120 by 832 pixels, although the pixels per inch changes to 75. The 21-inch monitor is preferable, if you can afford it.

Even if you don't have a specific use for color, I think you'll find that the color display is easier on your eyes than a monochrome display (others may disagree). During my tests of a NeXTstation Color machine, I switched back and forth from the 17-inch color monitor to the 17-inch monochrome. Even though the monochrome monitor is clear, clean, and very viewable, the color display seemed easier on my eyes, especially for long-term viewing. It was also considerably less garish than the 8-bit mode of the SuperMac monitor with Spectrum 24 card that I use on my Mac IIfx.

With both color displays, the NeXTstation's sound features are ensconced in a separate Sound Box, rather than incorporated into the monitor itself (as it is in the monochrome monitor), so you can use a 68MHz color monitor of your own choice instead of a MegaPixel Color Display. Considering the convenience, good price, and excellent performance of the MegaPixel tube, though, why bother?

Daily work

The real test of any workstation, whether or not you use it for color, is how easy it is to live with. The sad fact is that, unless you expect to become a master of UNIX shell scripts and proprietary color models, most UNIX workstations just aren't that much fun. For my money, every workstation should be as easy, reliable, and predictable to use as a Mac IIci or fx running System 7.0.

And that's where the NeXT machines really shine. Both the NeXTstation Color and the NeXTdimension are almost as easy to learn and use as System 7.0 Macs. And NeXTstep 2.0 provides some important interface improvements that help it keep its state-of-the-art GUI lead even over the improved Finder 7.0. With Release 2.0 of the system software, NeXT cleaned up many of the interface mistakes it had made, while strapping on new features like integrated color support.

If you had to pick a computer for doing your daily word processing, drawing, and basic engineering work, I don't see how you could go wrong with a NeXTstation Color. Even if you'd do as I would, and fill it with megamemory and the biggest internal hard disk you could buy, you'd still be talking about less money than any comparably equipped UNIX workstation.

As for the NeXTdimension, the lack of JPEG hardware support may dim the excitement a little, but not enough to hide the fact that its graphics support technology is far ahead of the competition in that price range. Let's hope that NeXT–and the incentive provided by the hardware itself–lights a fire under developers. ◆

DON CRABB *is the director of laboratories and senior lecturer in computer science at the University of Chicago and a contributing editor for* NeXTWORLD.

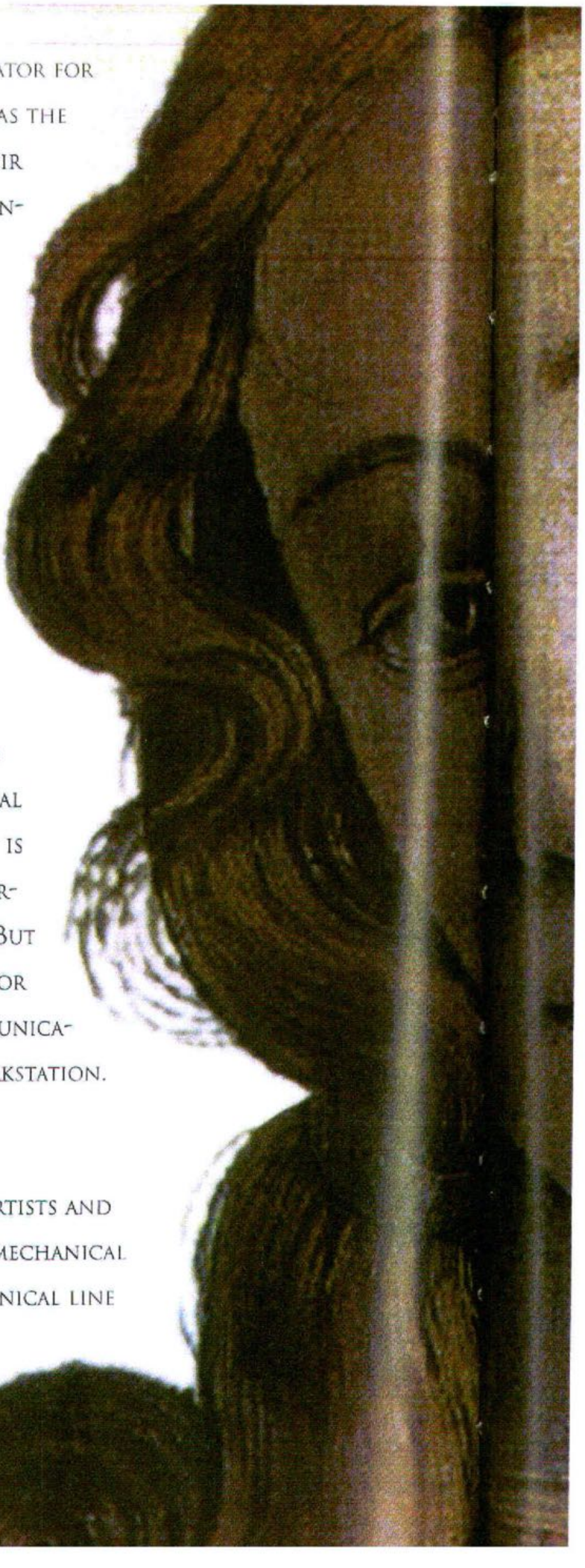
When Adobe introduced Illustrator for the Macintosh in 1987, art directors at publications such as the New York Times and Newsweek were convinced to pull their illustration work onto the desktop. The package revolutionized drawing, not only at newspapers and magazines, but anywhere illustrations were used in desktop publishing. A whole new genre grew around it: electronic art became a recognizable and popular illustration style in mainstream publications.

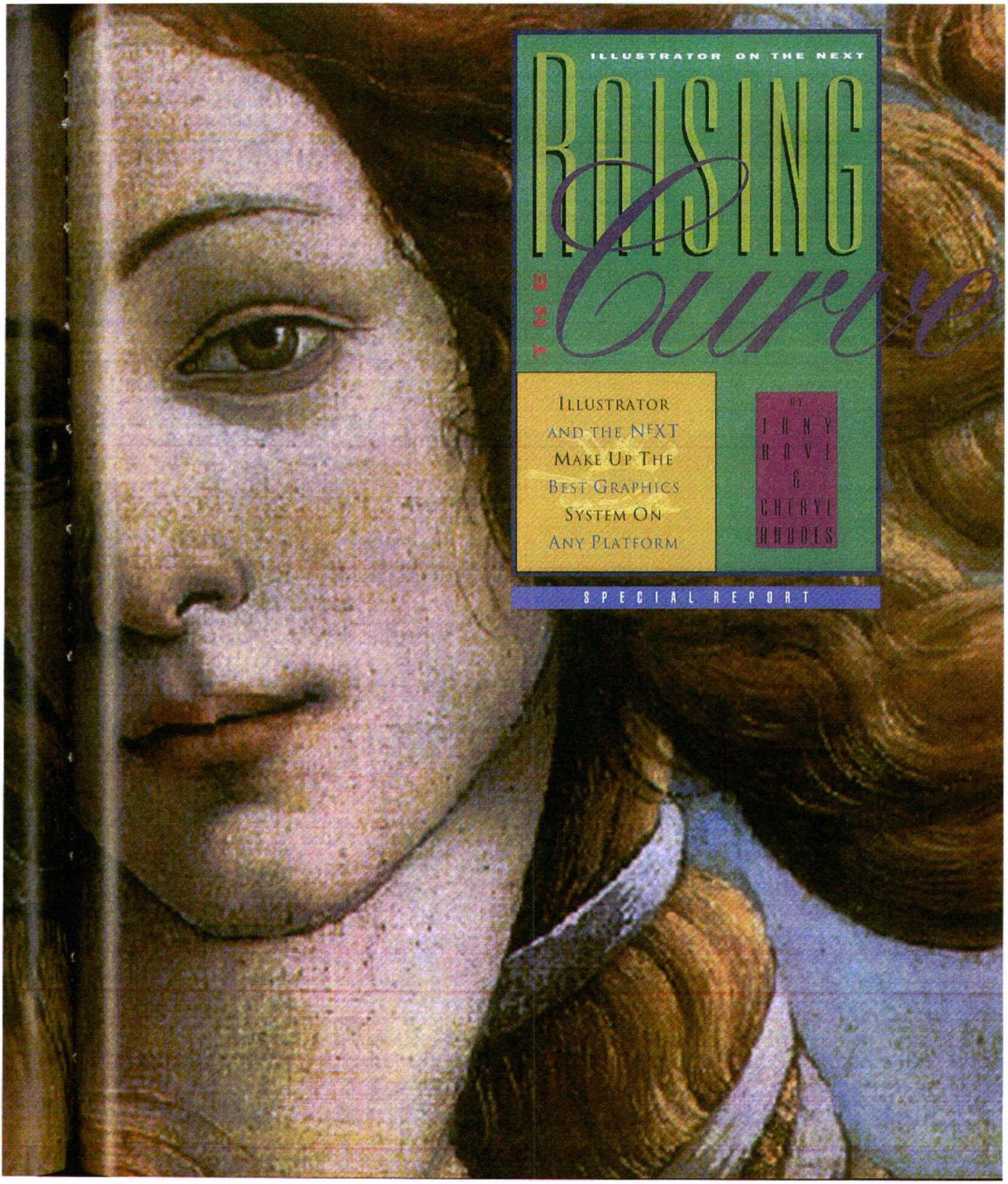
The latest version of Illustrator is now on the NeXT. Version 3.0 for the NeXT has all the features of Illustrator 3.0 on the Macintosh, additional features that will appear later in versions on other platforms, and benefits that can accrue only to software on the NeXT. In short, it's the best Illustrator anywhere.

The addition of Illustrator to NeXT's growing palette of color software heralds the arrival of professional illustration tools to the platform. Media Logic's TopDraw is great for simple drawings, and sundry other software offerings enrich the tool set (see the sidebar "Color Options"). But the combination of Illlustrator and the NeXT's native color handling, Display PostScript imaging, and advanced communication features make the NeXT an impressive illustration workstation.

Drawing on Expertise

Adobe Illustrator is a comfortable tool for professional artists and illustrators because it uses the paradigm of drawing with mechanical tools. It is also an excellent tool for CAD/CAM and technical line art because you can draw a complex image and scale it to any size, yet preserve the line weights if you want (the lines will not get thicker when you enlarge the image). [continued on page 26]





ILLUSTRATOR ON THE NEXT

RAISING THE Curve

ILLUSTRATOR AND THE NeXT MAKE UP THE BEST GRAPHICS SYSTEM ON ANY PLATFORM

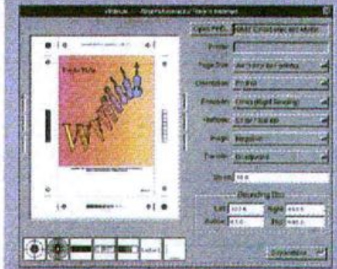
BY TONY BOVE & CHERYL RHODES

SPECIAL REPORT

Adobe Separator

Adobe Separator, a utility packaged with Adobe Illustrator, is as important to the NeXT in its own way as is Illustrator itself. Separator, which separates Illustrator files–or any other PostScript file–for color offset printing, represents a key software category for publishing and graphics applications.

Adobe Separator lets you print all of the process color separations (cyan, magenta, yellow, and black) in one operation–individually, as a color comp to a color printer, or as a comp translated to grays for a black-and-white printer. You can create separations for custom colors and Pantone colors for printing with custom inks (as one separation) or with tints of the four process colors.



Separator's main window displays the image for separation along with options for marking and printing.

The program offers options for four-color and custom separations, different page sizes, orientations (portrait or landscape), types of emulsion, and halftone-screen ruling (in lines per inch), and for positive or negative output.

Opening a file in Separator yields an image preview window that shows the artwork, with a dotted line representing the dimensions of the artwork's bounding box. The bounding box is defined in PostScript units (points), and represents the outside dimensions of an illustration (the smallest rectangle that could be dragged over all printable elements of the artwork). You can adjust this bounding box by dragging on the dotted line from any edge or corner.

Cross-hair register marks, trim marks, labels, color and gray bars, and star targets are provided as icons that can be dragged onto the preview image. These bars, targets, and marks are printed just outside the bounding box so that printers can align the pieces of film and position the image on the page. They are required by most print shops.

The Get Info command provdes information about the illustration's fonts, placed EPS images, patterns, and bounding box. This capsule is just what an image-setting service wants to know about any file you send them. You can print out the info box and send it with the file for output.

Separator allows you to specify a bleed area–a margin outside the printed area into which the image is extended, so that colors extend to the edge of a page when it is trimmed to the proper size. (Bleed can be used only if the bounding box of the image is smaller than the actual image.)

For some output devices you can specify a custom page size and an offset, to move the page away from the right edge of the printed sheet. The maximum page size depends on the resolution setting of the output device. For example, the Linotronic 300 can accommodate a larger page size when a lower resolution is specified.

A transfer function lets you adjust output tint values according to densitometer readings taken from the image setter. With appropriate settings, the transfer function helps ensure that the tint values in your separation will closely match the values originally assigned to the illustration.

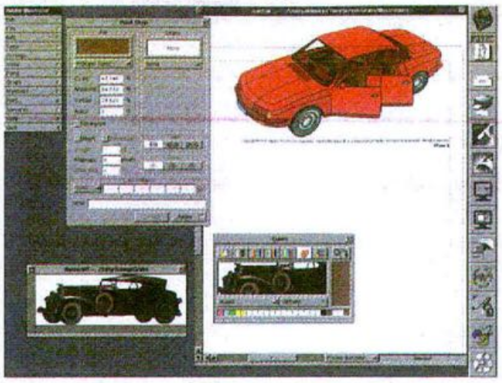
PostScript Printer Description (PPD) files for various printers and image setters ensure that separations are produced with the best possible control settings for each. The PPD device information includes the resolution, available page sizes, color support, and acceptable screen rulings for specific output devices.

Like the NeXT version of Illustrator, Separator has been thoroughly tested in its Macintosh incarnation and arrives on the NeXT platform ready for business and well known by prepress experts. The catch is, this key piece of software is only available with Illustrator. You'll have to buy the whole package to get your hands on this separation tool.

by TONY BOVE & CHERYL RHODES

[CONTINUED FROM PAGE 24]

Artists who like to start with rough sketches still can. Any scanned image–no matter how rough–can be brought into the program and turned instantly into line art using the automatic tracing feature.



Using the NeXT's color picker along with Illustrator's Paint Style panel makes it possible to sample a color from a TIFF or other open document and use it in your illustration.

Illustrator offers sophisticated curve-drawing tools to make curves of any shape and size and complements that set with myriad tools for adding patterns and colors. You can draw geometric or custom shapes or draw freehand, using a scanned image as a template. (The NeXT's is the only version that lets you use color TIFF images as templates.) The program offers automatic tracing over images as well.

You can display what you've drawn, display only the template, or display both the drawing and the template. The artwork view displays a "wire-frame" version of the illustration, for quick viewing and editing. You can see how the artwork will look when printed, including line weights and color, by choosing the preview mode. You can even quickly preview a selection rather than the entire illustration. A long-awaited feature–currently available only on the NeXT–lets you edit the illustration in preview mode. (The NeXT's Display PostScript makes implementing this feature much easier than on other platforms.)

The NeXT version of Illustrator 3.0–unlike the Mac's–lets you place TIFF images inside the Illustrator document and automatically trace areas based on color values.

Also currently unique to the NeXT version is the ability to view and automatically trace a color image as a template. You can limit the tracing to a certain color in the template, and you can set a color tolerance level (a percentage of the color you want the tracing feature to recognize) to trace only areas that are strongly colored.

COLOR PICKS

Color applications like Illustrator finally show the real advantages of NeXT's color picker (see the sidebar in "Color à la Mode" in "Primary Color" in this special report). You can use the color picker's magnifying glass tool to sample a color from a TIFF or any other image in any on-screen window, then add it to the color picker panel. The color is then available to assign to a path in the illustration.

Illustrator's color system lets you assign colors to illustrations either as CMYK or by specifying a Pantone color or custom color.

Adobe Illustrator 3.0

● ● ● ● ●

The NeXT version of Illustrator 3.0 adds features available on no other platform to the new page-layout and text features introduced with Illustrator 3.0 on the Macintosh. Along with Adobe Separator, included with the package, it brings professional-level illustration tools to the NeXT.

$695

Adobe Systems, 1585 Charleston Rd.
Mountain View, CA 94039.
415/961-4400, 800/344-8335,
415/961-3769 fax

Illustrato
Matchin
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PMS col
tem level
be availa
through
those neg
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within Ill
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Illustrato
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Illustrator supports Pantone Matching System (PMS) colors in the Paint Style panel. (NeXT is also negotiating with Pantone to license PMS colors for support at the system level, in which case they would be available to any application through the color picker. Until those negotiations are complete, however, they are available only within Illustrator.)

Color separation is provided by Adobe Separator, bundled with Illustrator 3.0 (see the sidebar). Illustrator can print to any PostScript color printer and its EPS (Encapsulated PostScript) format can be handled by any high-resolution imagesetter (see "Color In, Color Out" in this special report for more on printing color from the NeXT).

Illustrator's Blend tool creates blend steps from one shape and color into another; or you can use Blend with colors alone to achieve an airbrush effect.

OBJECT LESSONS

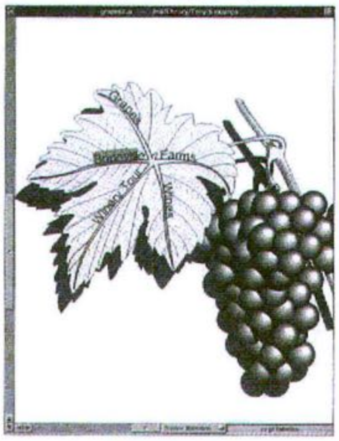
Keyboard controls make the program easy to use for drawing precise curves and shapes. You can switch from one drawing tool to another quickly, or bring up a panel for entering exact specifications for an operation, using combinations of the mouse button, the Alternate key, the Command key, the Shift key, and the space bar. You don't always have to go back to the tool palette–you can keep your eyes and hands on the artwork. Once you learn the tricks, you can draw complex images quickly.

There are several useful ways to select entire objects and pieces of objects, or just points within them. You can use rulers or other objects as guides for accurate drawing. On the NeXT version only, a grid feature enables you to accurately align objects. You can set the spacing of the grid and display the grid in front of or behind the artwork.

Anchor points can snap to all grid lines, just the horizontal or vertical lines, or just the intersections. Grid settings are saved with the document.

When scaling an object or group, you can choose uniform or constrained scaling, which preserve line weights or scale the lines, respectively. Grayscale shading, when enlarged or reduced, retains its exact density because it is repainted with the specified shading percentage.

Illustrator 3.0 adds full typographical control over kerning and spacing, hanging punctuation, indentation, and the horizontal scaling of characters. You can specify the color and thickness of the stroke and fill characters with colors or shades of gray. The Rotation tool rotates text by any specified percentage, or you can rotate text freehand, with the mouse. You can select and scale text and graphics together, because both are treated as graphics. Text is always editable with the Text tool.



Version 3.0's new type-manipulation features let you place text along a path. You can edit the text even after styling and placing it.

Type 1 PostScript typefaces can be used to create outlines of characters that can be edited just like other paths and modified to create logos, display type, or a variety of special effects.

Text can be styled with differ-

Color Options

Adobe's Illustrator and Separator applications join a growing list of programs that take advantage of NeXT color, including non-graphics applications that have graphics tools that work in color, and other programs that use color for other purposes, such as differentiating data in the interface. The list includes drawing tools, a spreadsheet, and single-purpose graphics tools that work with other programs to create a rich graphics environment.

You can tell a color-capable application by its icon: icons of programs that work with color display in color in the NeXT workspace.

Here's a rundown of the color-capable applications currently available and on the horizon.

Color Graphics Packages

Artisan 3.0 (Media Logic)
This image-retouching package is scheduled to ship this fall. The program, previously released on other UNIX platforms, will offer full-color retouching of TIFF images and supply color paint tools for image manipulation as well. The NeXT version promises to have the same functionality as the Sun (OpenLook) and SGI versions, but with a true NeXT interface, including support for the NeXT color picker.

Create!/TextArt (Stone Design)
Create! is a color PostScript paint program with lots of fun bonus features (see the review, *NeXTWORLD* January/February 1991). It lets you easily manage such special effects as "neon Beziers" and preview PostScript code before printing it. TextArt, the first graphics package from Stone Design, is a subset of Create! that offers the same fine drawing tools, but only in black and white.

Diagram! (Lighthouse Design)
Diagram!, a drawing package optimized for the quick building of charts and diagrams, supports full color. To draw, you simply drag elements off palettes. Clearly understandable inspectors and standard support for the NeXT color picker enhance its ease of use. The program is short on special effects and advanced techniques, but it provides basic tools in a package anyone can use.

"Stealth" (Altsys)
"Stealth" is the code name for an announced but as-yet unavailable color drawing program from Altsys Corporation, makers of Aldus' Freehand software for the Macintosh and DOS platforms. Those who have seen the progress on this package so far believe that Adobe will have some serious competition for their current spot as the NeXT color graphics leader. At press time, "Stealth" was looking toward a September or October 1991 release.

TopDraw 1.0 (Media Logic)
TopDraw 1.0 is a full-featured drawing package–the first available for the NeXT. TopDraw 1.0 was designed to function best with grayscale graphics and spot color, which it does admirably. Unfortunately, its user interface was established prior to some of the latest NeXT interface advances, so the program requires some getting used to, and it does not support the NeXT color picker. TopDraw 2.0 will support the new NeXT features when it ships toward the end of the year.

Non-Graphics Packages

FrameMaker 2.0D (Frame Technology)
FrameMaker is a full-featured document-layout tool aimed at publishers of long, structured documents (see the review in this issue). It includes its own set of graphics tools, but has no color graphics support, though it does have limited spot-color capabilities. FrameMaker has its own model for selecting and manipulating color–it offers no access to the NeXT's color picker.

HyperCube (Thoughtful Software)
HyperCube, due this fall or winter, is the NeXT's answer to the Macintosh's HyperCard, supporting color graphics as a central part of its tasks. The draw and paint palettes have a selection of simple, easy-to-use graphics tools. It includes basic color painting tools. The NeXT color picker serves to colorize any object you like. This package, however, does not easily export files in the usual graphics formats (EPS and TIFF) for publishing purposes.

Improv 1.0 (Lotus)
Improv (see the review, *NeXTWORLD* January/February 1991), is a new concept in presenting and manipulating numerical data disguised as a spreadsheet. Improv supports color in its whiz-bang charts and graphs.

Mathematica
Mathematica is one of the few programs that uses color as an integral part of its on-screen mission. Through exciting use of color, this complete system for doing, visualizing, and even hearing mathematics gives the user additional insights into the problem at hand.

Wingz 1.1 (Informix)
This is a very versatile, if somewhat quirky, spreadsheet application that includes drawing tools, a hypertext language, and desktop presentation tools, as well as stunning charts and graphs, on its color workbench. In fact, this broadly based application lets you use color for all sorts of purposes. On the down side, Wingz has declined to support System 2.0's interface guidelines, so does not support the color picker and other NeXT standards. Wingz's own color picker supports only RGB color, but it is easy to use and visual.

by RICK REYNOLDS

ent typefaces, sizes, and colors and can be automatically arranged to fit a shape, follow a path, and wrap around graphical objects. Even after text is set along a path, it can be selected and edited. You can also import text into a rectangular area that can be linked to other rectangular areas (for example, text in columns).

The program lets you import text in ASCII and RTF (Rich Text Format) formats, but not WordPerfect or WriteNow files.

Illustrator's graph tools automatically create charts and graphs (grouped or stacked columns, line, pie, scatter, or area) from numerical data. Chart data can be imported from a spreadsheet or entered directly into Illustrator's own mini-spreadsheet window. Charts can incorporate imported PostScript objects or TIFF images in place of chart elements like bars or line markers. This set of tools can create illustrated infographics up to the standards of the glossiest news magazines.

Graphs are created as a set of grouped objects. As long as the objects remain grouped, you can change the graph type or style with options from the Graph menu. Once ungrouped, the objects can be altered in shape and transformed as you would any other object.

The NeXT Edge

The NeXT version of Adobe Illustrator 3.0 has all the features of Illustrator 3.0 on the Macintosh, plus features that are unique to the NeXT. Some of these features, based on NeXT technology, will remain unique to the platform even when other versions are upgraded.

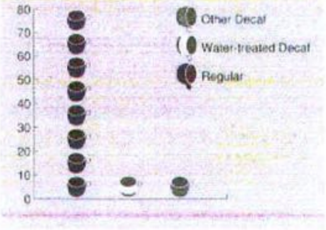
☐ Display PostScript allows you to view images exactly as they will be printed.

☐ An autotrace tool traces shades and hues in color images.

☐ Editing can be done in preview mode, so the effect ofchanges is immediately visible.

☐ You can import and display TIFF files, as well as EPS, and drag and drop those files into any Illustrator file.

☐ Detachable pull-down menus can be placed anywhere on the screen.



A new charting feature lets you import TIFF or EPS images to use as chart elements.

In future versions, Adobe plans to add support for importing Improv spreadsheet data, and we hope they also include the ability to import Improv charts and graphs.

THE ILLUSTRATION STATION

Adobe has done a masterful job of maintaining cross-platform compatibility while taking specific advantage of the NeXT interface. For example, NeXT users will be happy to see NeXT's system of icon dragging supported in the NeXT Illustrator. You can drag an EPS graphics file into an Illustrator window and drop it to place it–a substitute for the Place Art command in the Macintosh version. Yet the NeXT version maintains all of the features–and more–of version 3.0 for the Macintosh. It is difficult to pull this off, but Adobe has risen to the occasion magnificently.

Illustrator conforms to the NeXT interface for command keyboard shortcuts and pop-up lists, while retaining all the functionality of the Mac 3.0 version. Illustrator fits right in with all the other NeXT programs. We particularly like the ability to show all the menus at once so that we can pick commands from them without dragging. Every NeXT machine has a decent-sized screen that can accommodate various windows, palettes, panels, and menus while providing enough room for drawing and previewing.

Some of the advantages that NeXT's Illustrator currently boasts over the Macintosh version will be lost when versions on other platforms are updated. Some advantages, however, are inherent in the platform and are here to stay.

Perhaps the key NeXT advantage is Display PostScript. The NeXT version of Illustrator lets you see an accurate version of your drawing, even at high magnification levels, without the distortion inherent in translating from screen-imaging to printer-imaging languages.

The NeXT platform supports the ability to copy and paste PostScript objects with other programs, to send PostScript pages to others via electronic mail, and to allow others to view EPS files without running Illustrator. Macintosh users have to contend with at least two versions of the resolution-dependent PICT format to view pages without Illustrator.

Performance is another difference. The NeXTstation Color runs faster on some tasks than a higher-priced Macintosh IIfx configuration. When we moved Illustrator's preview window around the NeXT's screen, there was no redraw lag. (This is true for the '040 machines, but not the '030s. We don't recommend an '030-based NeXT machine for graphics work.)

The NeXT's sophisticated color picker, electronic mail service with audio support, EPS previewer, library services, and font management all enhance Illustrator significantly. An ad agency, for example, can work up a design for an ad page, e-mail it to a client who sees an exact replica (including the proper font and color) without having a copy of Illustrator, and receive from the client a voice-annotated version of the page for corrections. NeXT's built-in Ethernet connections make the NeXT attractive for large art departments that need to move images around the network.

Did we mention the PostScript fax capabilities of the NeXT computer (using Display PostScript and the built-in digital signal processor)? This capability alone makes the NeXT attractive for publishing and graphic arts work. Images can be sent via fax, in PostScript form, to be printed out on a high-resolution PostScript device (such as an image setter or platemaker) at another site. The PostScript format guards the quality of the images.

PICTURE PERFECT

After reviewing the benefits, we thought the picture was too good to be true: there must be something we could find that tarnishes Illustrator's reputation as the best drawing program for the NeXT machine, or that exposes dirty laundry in the NeXT system. Our only significant concern is the lack of an on-line help system. With the exception of that and a few nitpicks, though there's nothing wrong with this picture.

Illustrator's features–precise drawing and transformation tools, automatic tracing, scaling with line-weight preservation, automatic graphing, precise typographic control over text with special effects (like using a path as a baseline), and resolution-independent images–are irresistible for professional artwork and illustration. Our only wish is that a future version will offer the ability to use anti-aliasing techniques to blend illustrations within TIFF images. The NeXT computer has enough horsepower to do it, so we can expect future enhancements to Illustrator to be even more exciting. ◆

TONY BOVE AND CHERYL RHODES *publish the* Bove & Rhodes Inside Report *on desktop publishing and multimedia.*

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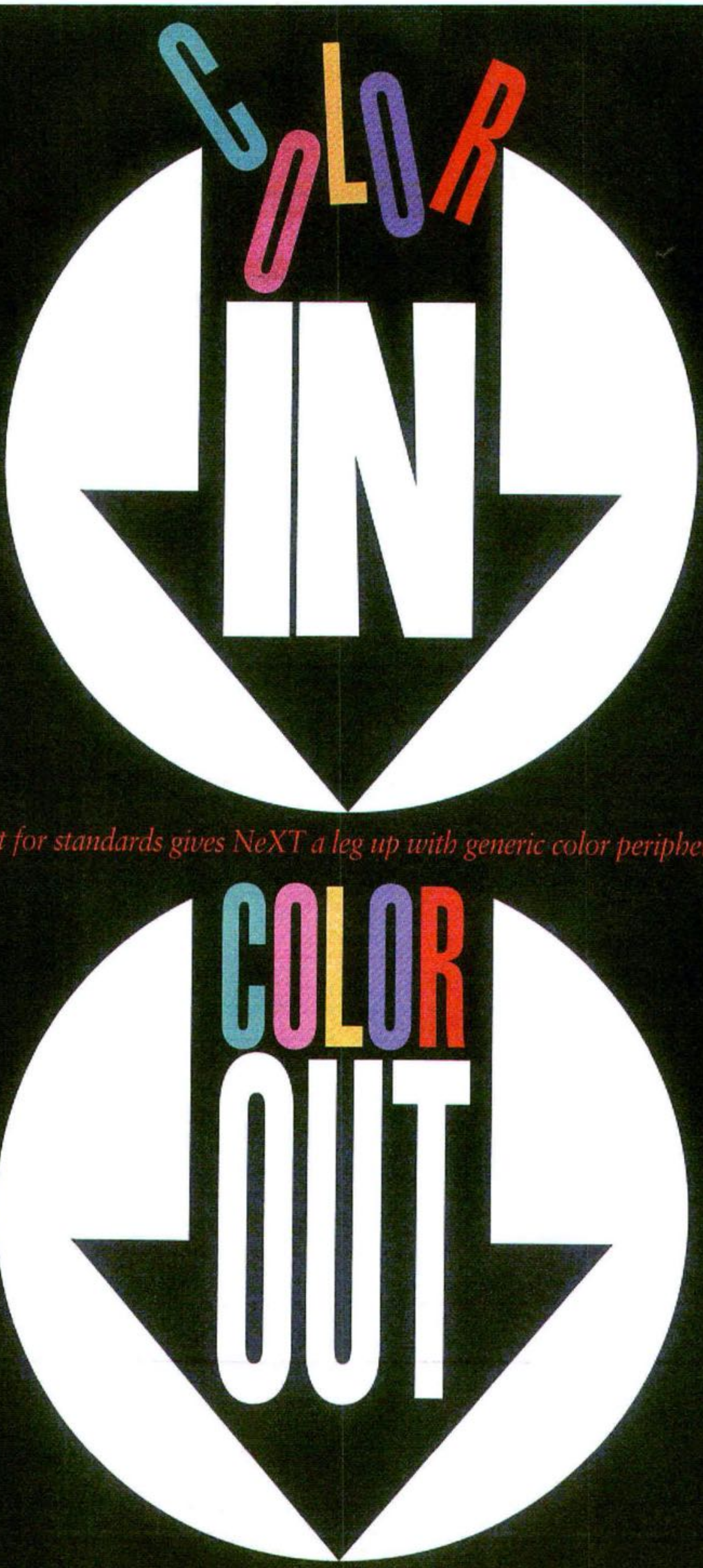
COLOR IN COLOR OUT



Support for standards gives NeXT a leg up with generic color peripherals.

by DAN LAVIN

Aside from enhancing the user interface, color on a computer has little use in and of itself. It can sharpen the distinction between layers in CAD drawings or make the red ink in debit columns in corporate worksheets more startling. But to really make use of color, you need peripheral devices that digitize analog images for your computer and translate them back into a visual form for publication, business presentation, or full-scale multimedia show.

▼

NeXT's use of industry standards–SCSI, PostScript, and TIFF–theoretically enables any device that supports those standards to feed information into the NeXT and accept its output. Attach any device, hit Scan, Print, or Capture, and it should just work.

▼

But is it really that easy? To find out, *NeXTWORLD* hooked up a sampling of non-NeXT color peripherals–scanners, video frame grabbers, printers, slide recorders, and video output devices. Along the way, we learned quite a bit about the ins and outs of NeXT color.

SCANNERS

The world of full-color original images is fair game for your computer creations, thanks to color input hardware. Scanners and video frame grabbers create bitmapped files from any type of original. Unfortunately, the choice of third-party devices for bringing color into your NeXT computer is fairly limited.

Because the NeXT includes no general facilities for scanning (as it does for printing), the interface to the hardware must be supplied by a third party. To date, only one color scanner, HSD's Scan-X Color (see the sidebar "One of a Kind"), will work with NeXT systems.

This may change in the near future. A wide variety of color scanners is available for the Macintosh that can physically connect to the NeXT's SCSI port. Rumor has it that an independent developer is working on generic drivers for a number of the leading scanners. Since it appears probable that a variety of color scanners will eventually be available, we will discuss them generically.

Flatbed scanners can scan anything that you can put flat on the glass, from photos to fabric. Other feed options include sheet-fed (which limits you to paper of certain sizes) or, at the high end, cylinder-fed. Slide scanners like the BarneyScan can read transparent originals.

Color scanners create RGB TIFF files by sampling each color separately. This can be done either by three separate scanning heads, in one pass, or by three passes of a single scanning head. The scanner software composites the image. Some scanner software even offers to turn grayscale scanners into color scanners by cleverly supplying filtering film, which the user places on the scanner's reading surface for each pass. Single-pass scanners guarantee the best color registration, since there is less chance that the orginal will move between readings.

Commercially available scanners generally have resolutions ranging from 50 to 300 dpi, selectable by the user, and color qualities from 2 bits of information (four colors) to 24 bits (16-million-plus colors) per pixel, also user-selectable. Keep in mind that bitmapped color data is huge, and the higher the image quality, the larger the file. A 300-dpi image in 24-bit color can have almost photographic realism, but a full-page version will be 24MB.

For high-quality publication work or output to slides, you'll want to use the highest resolution that your scanner–and your storage system–supports. For images that will be used only on-screen, choosing a resolution above 92 dpi (the resolution of the NeXT screen) is wasteful. Likewise, the number of bits per pixel is likely to be limited by the capacity of your storage medium, but the rule here is that more is always better, up to 24 bits. For some publishing applications, however, storage will be more valuable than color quality.

One of a Kind

Luckily, even though there is only one scanner for the NeXT, it is excellent. HSD's Scan-X Color scanner is a 24-bit, flatbed, three-pass color scanner. It can scan fron 50 dpi to 300 dpi in color, as well as 8-bit grayscale up to 300 dpi, and single-bit (for line art) up to 1500 dpi. The HSD software provides a preview mode that allows you to select part of the image for scanning (this can save a lot of space on disk).

HSD claims that its software, along with special enhancements to the basic mechanism, make this the most accurate scanner on the market. The HSD scanner offers only one pixel-depth option for color: the full 24 bits.

HSD provides free technical support and a one-year warranty.

$2995. HSD, 1350 Pear Ave., Ste. C, Mountain View, CA 94943. 415/964-1400, 415/964-1538 fax

Video for All

A color version of Metaresearch's Digital Eye, which has been shipping for some time, Color Digital Eye is a small box that connects to the DSP port of any '040 NeXT. At press time, Metaresearch expected a July release date. Color Digital Eye doesn't have the horsepower of the NeXTdimension, but it does have the same Philips image-processing chip set.

The system's ColorSnapshot software controls the input, getting around the problems caused by full-motion video data size in an ingenious way: It captures many frames per second, but only in a small window; you trade a high sampling rate for a smaller image and some video information. It can capture a full 30 frames per second at 114 by 85 pixels, 10 frames per second at 197 by 148, to 1 frame per second at 625 by 429 pixels.

One-year warranty; full tech support is available.

$1195. Metaresearch, 516 SE Morrison, Ste. M1, Portland, OR 97214. 503/238-5728

DIGITIZING VIDEO

NeXTdimension will accept a video signal from anything that produces video output, including any standard VCR, camcorder, or laserdisc. The signal is digitized by NeXTdimension's built-in video circuitry. Other NeXTs can use Color Digital Eye from Metaresearch (see the sidebar "Video for All"), a hardware/software system that sits between a video camera or video player and the NeXT.

The big problem with video is once again the size of the data. Video signals in the U.S. and Asia follow the NTSC video standard, which produces an image resolution of 640 by 480 pixels, with roughly 15 bits per pixel. A different standard, PAL, is used in Europe. NeXTdimension and Color Digital Eye convert either standard to 24 bits per pixel, and each frame of color video information is about 7MB in size.

Full-motion video requires 30 frames per second. That kind of input can make for severe bottlenecks as the system attempts to store the data, so computer systems use a compression algorithm to manage the flood. While NeXTstep Release 2.0 provides JPEG compression in software, the lack of a compression chip in the hardware (see "Primary Color" in this special report) imposes a limit of from a few to perhaps 12 frames per second, depending on the amount of memory in your system.

COLOR OUT

On other platforms, the computer's native imaging model is translated by a printer driver into the printer's imaging model. Because the NeXT uses PostScript for both internal (on-screen) and external imaging, the time-consuming interpretation process is bypassed. Also, since any PostScript printer can read its native format, the full range of PostScritpt output devices on the market, from slide recorders to color printers, will work with NeXT systems.

One benefit of PostScript is that each output device interprets a PostScript description to the best of its abilities. That is, if the device is capable of 2500 dpi, the file will be output at 2500 dpi; likewise, if the device outputs single-bit black-and-white or 32-bit color. A color image can even be displayed on a black-and-white machine and printed from there to a color printer, with all its information intact.

PostScript's device independence trips up in one area. You can print a color PostScript image to a NeXT black-and-white printer but not to generic black-and-white printers. The situation will be solved when PostScript Level II black-and-white printers come on the market. Meanwhile, though, the Display

PostScript code extensions that enable NeXT's color are limited to color devices.

PostScript also yields benefits in working with bitmapped images. Although such images top out at the resolution they start with (if the image was scanned at 300 dpi, that's the maximum quality of the output), PostScript scales and dithers bitmaps to match the higher or lower resolution of the output device. When going to a device with higher resolution, new dots will be interpolated to allow the image to scale up gracefully.

The only problem with NeXT's fidelity to the PostScript standard is that less-expensive color technologies like the $1000, low-resolution HP PaintJet printer won't work with NeXT. (In a few special cases, non-PostScript devices can run custom PostScript drivers, but it's a rare exception.) The entry level starts at $7000 for thermal wax technology.

PRINTERS

No PostScript printer manufacturer has released a model specifically for the NeXT, but several claim that their Macintosh models can be used with the machine (see the sidebar "A Spectrum of Printers"). *NeXTWORLD* tests showed the claims to be true; the top color models worked flawlessly. There were only two problems.

First, speed. Unlike NeXT's own printer, which connects to the system's printer port, third-party devices must use a serial connection, which slows data flow by a factor of 500. In practical terms, that means a full-page Illustrator image sent to a non-NeXT color printer could take about four minutes to print. Optionally, you can tie the printers into your Ethernet network using an AppleTalk router like Cayman's GatorBox. Although that's an additional investment of $3000 to $5000 and lots of system administration time, print speeds are several times faster than through the serial port. It is probably worth the cost if you'll be doing a lot of color printing.

The second limitation is the lack of full support of the Print panel options. NeXT's system software includes Adobe's printer description files for 60 printers, but it does not make use of the information in these files. This means that users cannot control the resolution and paper feed options (regulated by printer commands rather than PostScript code) unless the application software provides the support.

The two paramount color printing technologies are thermal wax and color laser. Thermal wax works like a four-color printing process, building up images through successive applications of dots of different colors: either cyan, magenta, and yellow, or cyan, magenta, yellow, and black (for greater richness). Here, though, the dots are of wax instead of ink. The effective resolution for a 300-dpi printer using this technology is actually 150 to 200 dpi, due to the spreading of the wax dots on the paper.

Print to Film

Agfa has announced four models (the ProColor Premier, the Slidewriter, the QCRZ, and the Forte) for use with the NeXT. They allow production not only of slides but, with special attachments, also Chromalins. Agfa uses Adobe PostScript and provides a whopping 73 fonts. These devices are extremely expensive, but produce the highest-quality color output available on the NeXT.

The Agfa recorders also provide the ability to do rudimentary color correction; trial-and-error tweaking can be done on the device itself. We were not able to use the recorders in-house for this article, but they have been used successfully at NeXT Computer.

Agfa provides toll-free technical support and a 90-day warranty.

Slide Recorders $7000–$32,000, ChromaScript PostScript option (required) $17,000. Agfa Corporation, 1 Ramland Road, Orangeburg, NY 10962. 800/288-4039

A Spectrum of Printers

In order to confirm the claim that any PostScript color printer should work with the NeXT, *NeXTWORLD* tested five of the best-selling PostScript printers released for other platforms. Within the limitations concerning speed and non-PostScript support mentioned in the article, they all worked well. Although we hit some glitches while installing the devices, the slight problems were worth the effort to get color prints off the NeXT.

Océ Model G5241-PS

This is the sleekest and best looking of these printers. The Océ is the highest-priced printer we tested but also claims the highest-rated engine life. It provides 8MB of memory and 35 Adobe PostScript fonts, and it supports legal and letter sizes.

Setup is easy on this one, with a clear configuration panel. Colors on the Océ are bold and strong.

Océ provides technical support and a one-year warranty.

$8990. Océ Graphics USA, 385 Ravendale Drive, Mountain View, CA 94039. 800/545-5445

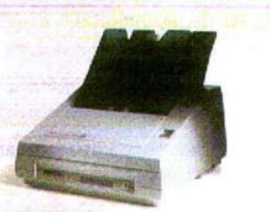
The thermal wax process uses a hot print head to melt small dots of ink from polyester sheets covered with ink (one for each color) onto either paper or transparency film. The wax sheets feel like Saran Wrap, with all the problems of handling Saran Wrap (although the sheets are much more durable than they seem, and we encountered no actual problems installing them). The process requires a full sheet of wax ink for every color of every image, regardless of the amount actually used. Each roll holds enough sheets for between 100 and 250 impressions. This, plus the fact that this type of printing requires special paper or film, makes for an expensive technology. After paying $6000 to $10,000 for the printer, expect to pay about 50 cents a print for paper and $1.50 for transparencies.

At press time, an exciting alternative was emerging. Tektronix was planning a June 18 announcement of a new color printer using phase-change ink-jet technology. Instead of wax sheets, Tek's phase-change printer uses melted reservoirs of CMYK (cyan, magenta, yellow, black) inks that harden when they hit the paper. This technology requires only the amount of ink needed to produce a given image, with no wasting of ink sheets. This also enables you to econmically use the printer for printing the occasional page of plain black text.

Further, it's a plain paper technology, meaning that, within certain tolerances, it will print on anything, from letterhead to burlap. A page of black text on this printer costs 5 cents, color is about 25 cents per page for the average sheet with 30 percent coverage (These costs don't include the nominal cost of plain paper.) Pages with denser coverage cost slightly more.

In general, the quality of phase-change output is also higher than thermal wax. The registration of the indivdual dots of ink is much better than with thermal wax, and the prints are more scratch-resistant. And because the printer cost ($9995) is only slightly higher than for thermal wax printers, it seems likely that phase-change ink-jet printers will become the preferred technology.

Canon's color laser copying technology is the premiere color alternative. Canon and other vendors supply controllers that turn Canon Color Laser Copiers into color printers capable of creating either dithered or continuous-tone CYMK output at 400 dpi. Unfortunately, the price of such high quality is steep. The copier itself runs $50,000, and the controllers that turn it into a printer cost another $30,000 to $40,000.



NEC Colormate PS Model 40/80

NEC's Model 40 is the lowest-priced printer we tested. The tradeoff is that you get only 17 fonts and 4MB of RAM. The Model 80 provides a more standard 35 fonts and 8MB of memory, and it handles legal-sized paper. Both models use true Adobe PostScript. The colors on the NEC are somewhat subdued and grainy compared to the other machines.

We like the unique top-loading paper hopper on this machine. NEC also deals best with the Saran Wrap problem: its rolls come partially enclosed in cartridges. Documentation is clear and copious. We also appreciate having a front panel with an LCD readout.

NEC provides toll-free technical support and a one-year warranty.

Model 40 $6995; Model 80 $8995. NEC Technologies, 1414 Massachusetts Ave., Boxborough, MA 01719. 800/632-4636

Seiko Colormate PS Model 4

The Seiko is the smallest machine we tested and comes with the most fonts (39). It's also among the lowest-priced. It comes with 6MB of memory and the PhoenixPage PostScript clone. Seiko's colors are well saturated, but registration seems less sharp than on the other machines.

Installation is made easier by an easy-to-use configuration panel–and harder by the need for a non-standard cable (not included). Seiko's paper comes on a roll, making it easy to switch from letter to legal size. It's a handicap when you want to switch to transparencies, but makes the cost per transparency significantly lower than for other printers.

Seiko provides 90-day on-site service and phone-in technical support.

$6999. Seiko Instruments USA, 1130 Ringwood Court, San Jose, CA 95131. 408/922-5800

SLIDES & VIDEO

Another type of PostScript output device is the slide recorder, which translates information from a color file into an RGB composite image that is output to photographic film for use in computer-generated presentation graphics. Because a slide recorder package includes an internal CRT, a 35mm camera, and complex software, it is expensive, ranging from $10,000 for moderate quality to $35,000 at the highest end.

The only slide recorders specifically announced for the NeXT are those from Agfa (see the sidebar"Print to Film"), but here, as with PostScript printers, any PostScript film recorder should work. The limitations on non-NeXT film recorders are the same as for printers: the serial hookup is slow, and non-PostScript commands are not supported by NeXT's operating system.

Slide recorders offer high resolution–35mm film has so many dots that it is almost an analog medium. They also provide the best color quality. The quality of the output depends on the quality of the recorder's internal CRT.

The last type of color output is video-out, in which computer-generated images converted to analog video signals for storage or display on video peripherals. NeXTdimension supports video-out in both NTSC and PAL formats. It can also record to a variety of media, including VHS, VHS-S, and Hi-8. For animation, NeXTdimension supports frame-by-frame output. An unheralded use of NeXTdimension's video-out is as a simple projection: direct composite output comes right out the back of the machine. For the time being, no other video-out options are available for the NeXT.

THE INS AND OUTS

Thanks to its support of standard technologies, the NeXT's color I/O options are far greater than one would otherwise expect for a new platform. With the exception of scanners, the NeXT's options for all types of color digitizing and output are on a par with the Mac's and PC's, and no other platform can match the video options of the NeXTdimension. Some setup is required, but the important fact is that a lack of hardware won't stop you from setting up a color shop.

The pieces are in place, but the wish list is still long. Although the NeXT's scanner offering is a good one, some competition would be welcome. Scanner drivers shouldn't be hard to put into place and are an easy first step to broader choices. Built-in support for AppleTalk and other protocols–or better yet, direct support for the NeXT from more vendors–would make color printing more accessible. Video compression on a chip is still necessary before video manipulation will rise to its real promise. But as these technologies appear, the NeXT's ability to handle the large data streams that they produce, its horsepower, and its unified imaging model will be real strengths.◆

DAN LAVIN *is a Senior Editor at* NeXTWORLD. His skin color: cyan 26, magenta 33, yellow 66, black 2.

QMS ColorScript 100

The QMS ColorScript 100 includes 35 fonts fnd 5MB of memory. It's among the easiest of the printrs to use, thanks to the fact that each color roll is placed in a separate tray outside the machine, reducing installation gymnastics. The front configuration panel has touch-sensitive switches (which, however, limit your ability to make sophisticatd configuration choices). The PostScript is true Adobe and the documentation is clear and complete. The QMS boasts a large image size and separate inks for business presentations and color-proofing applications. The proofing colors that we tested were subdued and slightly washed out.

QMS provides tech support and a one-year warranty.

$8995. QMS, One Magnum Pass, Mobile, AL 36689. 800/631-2692

Tektronix Phaser II PX

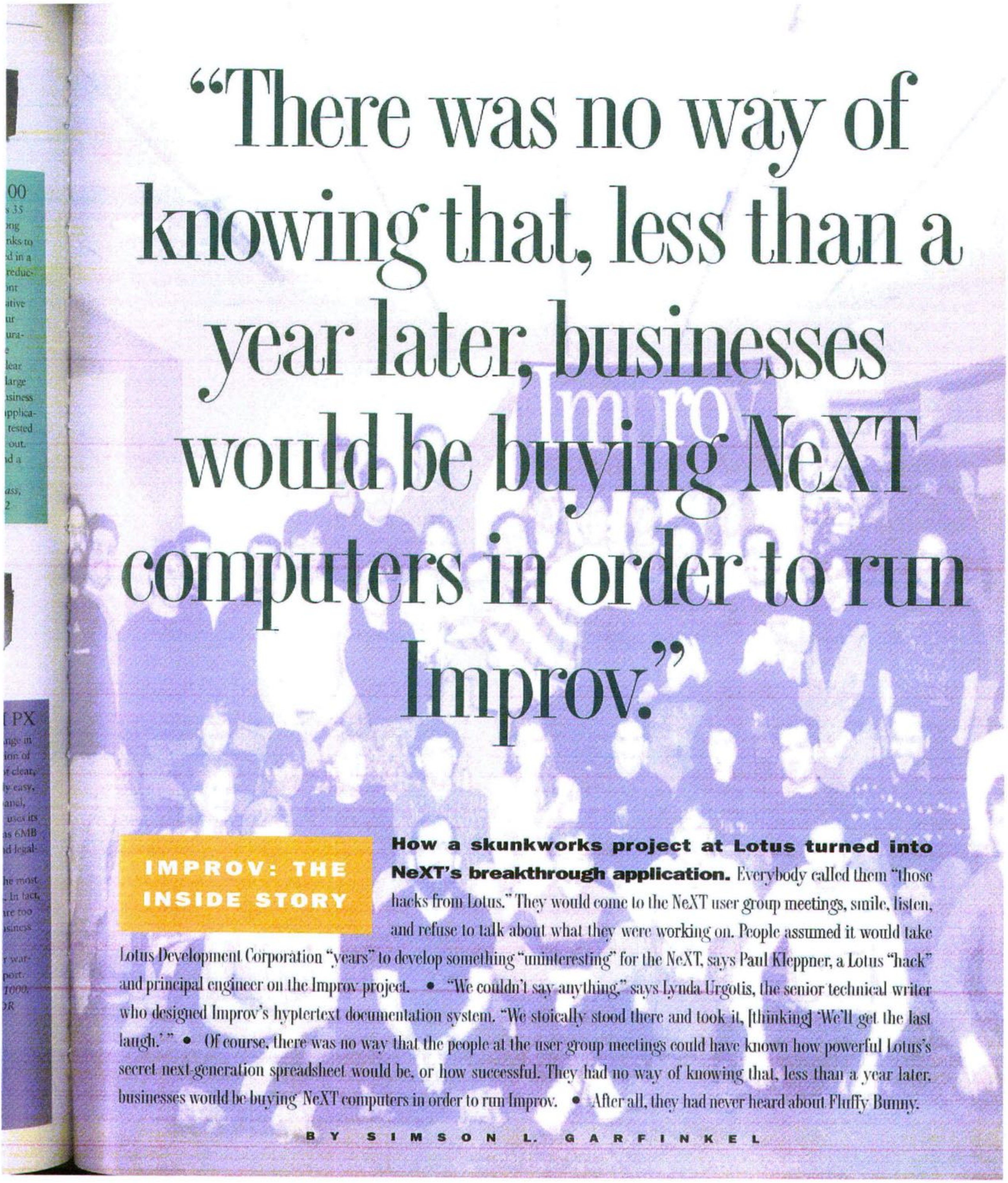
This printer represents the midrange in price. It has the best documentation of any of the printers we saw, full of clear, concise detail. Installation is fairly easy, though it has no configuration panel (available on the upscale DX). It uses its own version of PostScript and has 6MB of memory. It supports letter- and legal-sized output.

Colors are stong and bright–the most impressive of all our tested units. In fact, some users might feel that they are too cartoony and bright for some business uses.

Tektronix provides a one-year warranty and toll-free technical support.

$7995. *Tektronix, P.O. Box 1000, Mailstop 63-583, Wilsonville, OR 97070. 800/835-6100*

“There was no way of knowing that, less than a year later, businesses would be buying NeXT computers in order to run Improv.”



IMPROV: THE INSIDE STORY

How a skunkworks project at Lotus turned into NeXT's breakthrough application. Everybody called them “those hacks from Lotus.” They would come to the NeXT user group meetings, smile, listen, and refuse to talk about what they were working on. People assumed it would take Lotus Development Corporation “years” to develop something “uninteresting” for the NeXT, says Paul Kleppner, a Lotus “hack” and principal engineer on the Improv project. • “We couldn't say anything,” says Lynda Urgotis, the senior technical writer who designed Improv's hyptertext documentation system. “We stoically stood there and took it, [thinking] ‘We'll get the last laugh.’” • Of course, there was no way that the people at the user group meetings could have known how powerful Lotus's secret next-generation spreadsheet would be, or how successful. They had no way of knowing that, less than a year later, businesses would be buying NeXT computers in order to run Improv. • After all, they had never heard about Fluffy Bunny.

BY SIMSON L. GARFINKEL

Next generation

The idea that eventually grew into Improv started in 1986, when Lotus Development Corporation took an empty library on the first floor of its building at 161 First Street in Cambridge, Massachusetts, and set up the Advanced Technology Group (ATG).

ATG's charter was to come up with new ideas that Lotus might be able to turn into products. There were three projects and three researchers: a new development environment, an artificial intelligence system that never panned out, and "Modeler"–the seed of Improv.

One of the hardest things about using a computerized spreadsheet like Lotus's 1-2-3 is laying out the initial model: How to arrange the rows? The columns? It is simple enough to start entering numbers and formulas in cells; it is another thing entirely to create a structure that you can grow with.

Enter Pito Salas, a bright developer in the ATG. Salas studied a variety of complicated models that had been built with conventional spreadsheets and discovered that most of them employed a few basic patterns. If a spreadsheet program could be taught to understand those patterns, he realized, it would be much easier to use.

Within a few months, Salas had come up with the fundamental idea at the core of Improv: that the raw data in a spreadsheet, the way that the user views the data, and the formulas used to perform calculations can all be separated from one another. The formulas should be general, so that the user can type something like, "PROFIT = PRICE - COST" and have the spreadsheet calculate every PROFIT cell from its corresponding PRICE and COST cells. The user should be able to rearrange the views to highlight the relevant information and relations. The data itself should be stored in a multidimensional data structure. A slick interface should sit on top, to make it easy to get information in and out.

By the end of the summer, Salas had a demonstration program working on an IBM PC. It was really more a slide show than a computer program, admits Salas: The math was all faked. The project stalled at this phase until February 1987, when Salas hired Glenn Edelson, a hot programmer whose job it was to take Salas's ideas for general formulas and see if they could be implemented in C++.

"I had described all those [ideas] with hand waving," recalls Salas. "I had no clue how to build it. Glenn came in and we started working."

Things clicked. It soon became obvious that the technology for calculating general formulas could work and that multidimensionality was a powerful way to model complicated financial problems. In the spring of 1987, Salas hired Bonnie Sullivan to write a specification for the project and Jeff Anderholm to see if there was really a market need for a "high-end financial modeling application."

That summer, Modeler went on tour. The "road show," as Salas called it, took the Modeler demo program to six of Lotus's key customer accounts. At each stop they spent a day with a few analysts who did high-end financial modeling.

"We had a paradigm shift on that trip," recalls Salas. "It was really cool. We said that these ideas might be turned into a high-end financial modeling package of interest to perhaps ten percent of your company, and they said 'No, no, no! What you have is the next generation spreadsheet–something that will be used by half of our company!' "

Despite the enthusiastic comments, Lotus still took more than a year to decide to turn Salas's ideas into a product. The decision was finally made in September 1988 to go ahead with the "Back Bay" project (named after a Boston neighborhood known for its townhouses, boutiques, and restaurants). After experimenting with interfaces and a database engine under DOS and the Macintosh operating system, the group decided that the product would be based on OS/2 and Microsoft's Presentation Manager. They even picked a mascot–Fluffy Bunny–and started up an underground newsletter, "Fluffy Bunny Goes to Back Bay."

> "We thought we had a high-end financial modeling package, but customers said, 'No. It's the next-generation spreadsheet.' "

Green light

A month later, in October, Steve Jobs came to Lotus to show off his new computer. After the talk, Lotus's top management gave Jobs a private show-and-tell of their most interesting products then under development.

Salas showed Jobs a clunky, character-based spreadsheet, but all of the future elements were thereFormulas were entered at the bottom of the spreadsheet rather than integrated into the cells; it was multidimensional; and the user could instantly call up different views of the same data set.

Immediately, Jobs wanted Back Bay for the NeXT.

"He kept getting more excited. He was the most excited person in the room," remembers Salas.

Back Bay fit right in with Jobs's vision, says Allen Olsen, ATG's development manager. "Right from the start, he was looking for something new. It might have been better financially for his company to get 1-2-3, but that would have compromised his vision. [Back Bay] was attractive because it was a new kind of spreadsheet."

Likewise, the Back Bay group was excited by the NeXT. But when Jobs went back to California, the Back Bay group continued working on the OS/2 product–or at least they tried. Writing applications for the buggy initial releases of OS/2 and

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Presentation Manager was no picnic. And the allure of Jobs's black cube kept creeping back into their minds.

The decision to switch Back Bay to the NeXT came four months later. Ed Belove, the vice president of advanced technology, left a Post-It stuck on Salas's computer: "Pito–Come see me as soon as you get back. This is very important.–Ed."

"I think that [Lotus CEO] Jim Manzi really believed in us," recalls Jobs. "When the Improv team recommended to proceed on the NeXT (after their failure on OS/2 and Presentation Manager), Jim gave the green light."

There were both marketing and technical reasons for moving Back Bay to the NeXT, says Frank King, vice president of Lotus's software business group. By putting Back Bay on a computer platform that couldn't run 1-2-3, Lotus wouldn't have the problem of explaining to customers which spreadsheet to use for which application. There wouldn't be any marketing conflicts with Lotus's cash cow.

But King also wanted his engineers to experiment with the NeXT development system. "I have a lot of respect for Steve and the technology he has developed," says King. "I wanted to see if the things he was saying about NeXTstep were true."

The switch also gave the Back Bay group the freedom to rethink some of the basic ideas about the user interface. Rather than try to port the code written for Presentation Manager to the NeXT, the group resolved to rewrite the entire user interface from scratch. "We knew that we had a lot of work to do in the UI area, and it seemed that it was quick to do [on the NeXT]," recalls Olsen.

A few days after the decision, Steve Jobs sent a huge bouquet of flowers to Cambridge. "It was like he was wooing us," says Lynda. "It must have been three feet tall!"

Perhaps more important, NeXT sent technical wizard Bruce Blumberg to Lotus, where he gave the Back Bay developers a special one-week class.

Fluffy Bunny was off and running.

Direct manipulation

The best part about developing a user interface with Interface Builder wasn't the ability to design a single interface quickly; it was the ability to try out a lot of them. "It let us develop a lot of bad UIs," says Salas. "We could have an idea, and in an hour we would have it on the screen."

For example, an early version of Improv's Item Dispenser was simulated with Interface Builder and multiple windows. Other times, developers used the program merely as an electronic blackboard to sketch out ideas before writing the code to make the ideas work.

Perhaps the single most important and unique aspect of Improv's user interface is its Category Tiles, which the program uses to represent different dimensions of a multidimensional data set. But in January 1989, Back Bay didn't have Category Tiles. Instead, all of the view rearrangement was done with menu commands with names like Promote, Demote, and Perspective.

"It had all of these arbitrary restrictions," says Kleppner. Then the group hit upon the idea of using icons. "We realized that if we represented these things as icons, all these manipulations could be represented by moving icons from one place to another."

The Category Tiles also "broke through a lot of barriers in understanding for new users," says Salas. They let users visualize and directly manipulate the dimensions of the multidimensional database.

But where should the icons for the categories go? After trying a lot of different ideas, the developers decided to put them in their own window.

By putting Back Bay on a computer platform that couldn't run 1-2-3, Lotus avoided marketing conflicts with its cash cow.

"And then Steve Jobs came," says Kleppner, remembering Jobs's visit in April 1989. "He said, 'Okay, who's the guy who came up with the picture? It's very important that he be here.' "

Jobs then said that the category manipulation had to be more direct. "You have to be able to touch the categories and move them around. Having them off in a separate window is too removed," Kleppner remembers Jobs saying. "He didn't even want to have the tiles; he wanted to just move them around. He's a fanatic for direct manipulation, and it really shows."

Jobs didn't have an answer, says Kleppner, but "one of the benefits of that [meeting] was that we junked the idea of the extra panel" and put the Category Tiles on the worksheet itself.

Conflict resolution

In a way, Jobs himself became an icon on the Improv development landscape. "He would come in periodically, tell us what he liked and what he didn't like," remembers Kleppner. "We didn't do everything he wanted, but he pushed us in the right direction a lot of the time."

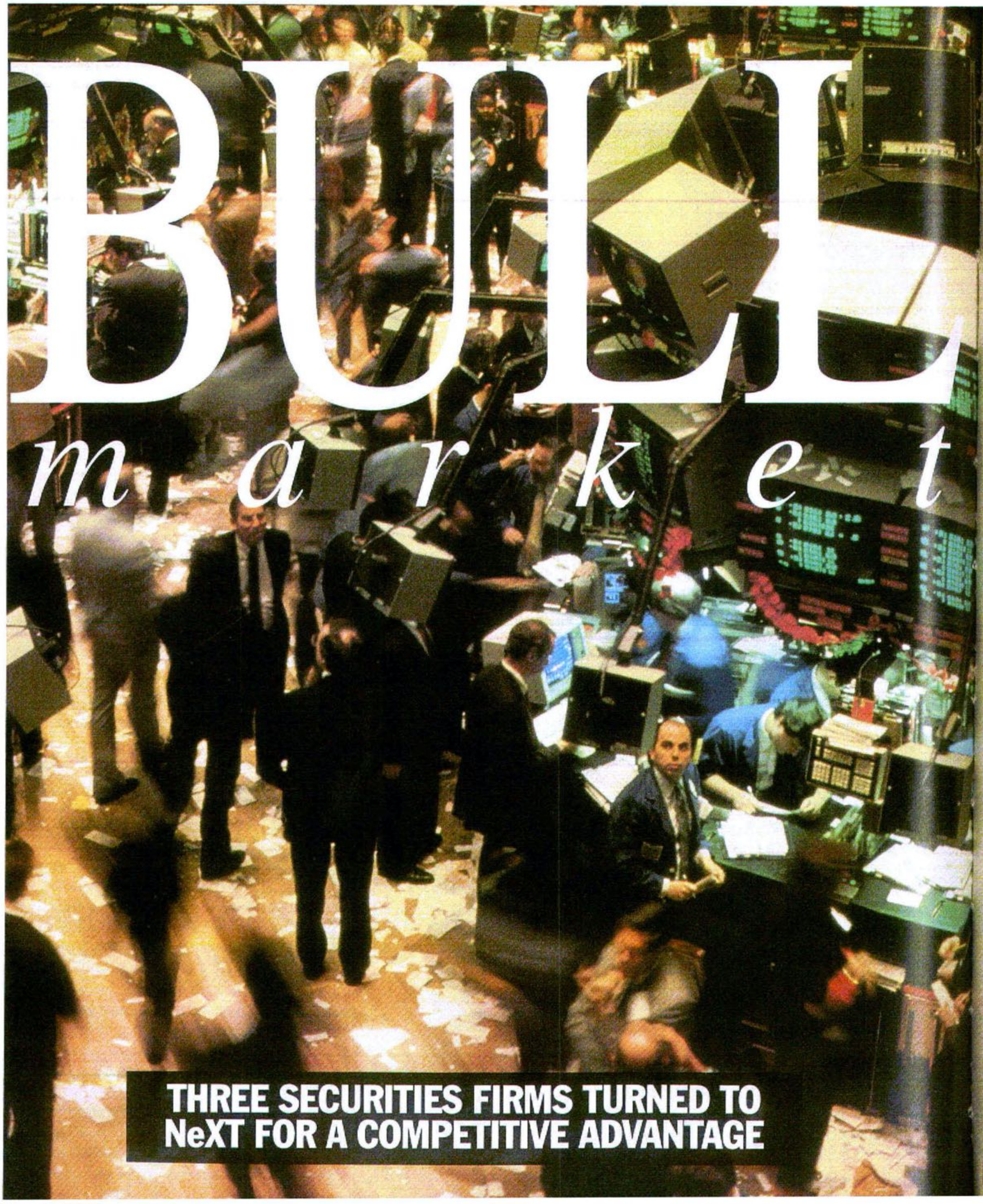
For example, in one issue of "Fluffy Bunny Goes to Back Bay," Fluffy Bunny is warned: "Sometimes formulas are friendly, but sometimes they are Not Very Nice."

Formula conflicts were the problem. Since Improv has general formulas, it's possible that a single cell can be specified by more than one formula. A business's total profit over two years could be calculated either by subtracting the total price from the total cost or by summing the profits for each year.

The Back Bay group thought that the possibility of formula conflicts was a real weakness in the

[CONTINUED ON PAGE 79]

BULL *market*



THREE SECURITIES FIRMS TURNED TO NeXT FOR A COMPETITIVE ADVANTAGE

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Wall Street. Traders hovering over terminals and Teletype machines, telephones at every ear, eyes on the ticker. Few business environments demand more of people and machines. On The Street, decisions must be made instantly. Seconds make the difference between profit and loss.

Wall Street presents a golden opportunity to provide tangible evidence of what a NeXT system can do. It is the ideal professional workstation application, the proof of the pudding. "Everyone can understand computer usage that deals with money," says George Cummings, NeXT's New York sales manager.

Wall Street has been paying close attention to NeXT since the introduction of the 68040 NeXT last fall. Companies impressed by NeXTstep but looking for more processing speed have moved from evaluating to installing. In New York City, three financial firms already have significant installations, and another four are close behind.

This is the story of how three financial firms betting on NeXT are playing this high-stakes, high-technology game. Two are New York securities firms. The third is a Chicago options-trading firm. But while these companies may all be in similar lines of business, they chose NeXT for very different reasons.

The one thing they have in common is their goal of shaking a profit out of their investment in NeXT.

By JONATHAN LITTMAN

Lehman Brothers

A division of Shearson Lehman Brothers

Location: New York

Application: Sugar commodities trading

Hardware: 3 NeXTcubes, 4 NeXTstations

Key Software: Interface Builder, Mathematica, Sybase and Objective C

Goal: Unify data from existing terminals, workstations, and mainframes on NeXT computers.

Sugar may seem simple to most folks, but ask Eric Spahr, vice president of Lehman Brothers' sugar department, and you'll see that even the sweet stuff can go sour. "Sugar is an extremely volatile commodity, doubling or halving its value every year," says Spahr. "To keep up with those wild changes, you need a lot of computing power."

When Spahr began looking to fulfill the needs of his ten-person, six-trader department, he knew what he didn't want. He had seen how Lehman Brothers' existing Sun networks required constant in-house technical support. Not only did Spahr lack the staff to run a complex network, but he had limited access to consultants. And he himself was no techie.

But after 24 hours on a NeXT workstation, Spahr wrote a small custom trading program that worked. "My initial reaction was, 'I'm not a programmer, but gee, I can do this,' " says Spahr.

Spahr and the six traders in his department trade tens of millions of tons of sugar annually. And with raw sugar trading at $170 a ton (at this writing), that's billions of dollars worth of sugar a year. Just 12 months ago, raw sugar traded at $360 a ton. And 12 months before that it was back down at $170. Spahr has been surprised at how fast he's been able to build custom applications to accommodate the rapid swings of the market. "These custom applications enable me to be on top of those changes," he says.

Quite simply, NeXT is helping him to get the job done–fast. "What it is allowing me to do is to buy some shrink-wrapped software and combine it with other stuff I write and satisfy what people need to do, without techs."

Spahr did require some outside help to install Sybase and coordinate his NeXT network with Lehman Brothers' wide variety of mainframe networks, but by and large he's been surprised at how well the applications have worked together. Spahr appreciates being able to take files he's set up and put them into Improv. Or to take an Improv number and put it into Mathematica.

Spahr uses Mathematica in an option-evaluation program he wrote. "It really shows off the machine, and it shows off Mathematica," he says, adding that it's easier to sell a customer on a recommendation if they can see what an investment will do graphically in Mathematica.

At press time, Spahr hoped to have most of his sugar-specific custom programs running in the next few weeks on the three cubes and four slabs installed in the sugar department. His long-range goal is to unify the data that runs on the mishmash of computers, terminals, and devices that clutter a typical sugar trader's office.

"We're dealing with six or seven different machines: a mainframe to do analytics, another to do technical analysis, a series of data-feed machines, and stripped-down PCs, telexes, and faxes. Hopefully, one day they'll all run through the NeXT and communicate."

Union Bank of Switzerland

Union Bank of Switzerland Securities
Location: New York
Application: Equities derivatives trading
Hardware: 14 NeXTstations
Key Software: Interface Builder, Objective C
Goal: Achieve competitive advantage by developing custom trading applications.

"It's a major political battle to buy NeXT," says Hadar Pedhazur, vice president, Equities Technology at Union Bank of Switzerland Securities (UBS Securities) in New York. "People are asking, 'What if NeXT goes out of business?'"

Pedhazur thinks that those who employ the doomsday argument misunderstand what NeXT offers. "We don't believe NeXT is going out of business, but it's a risk we're willing to underwrite for the benefit of using NeXT computers," says Pedhazur, who under the direction of A. Ramy Goldstein, manager of Equity Derivatives Products, is leading UBS Securities' efforts to install 14 NeXT machines for its equity derivatives traders. "We're in a business where responding in days or weeks instead of months is the difference between profit and loss," says Pedhazur.

Besides, Pedhazur says, the machines will earn their keep quickly. "If NeXT allows the bank to play in a new financial arena, we might make all the money to justify the risk within a one- or two-month period."

This is no dull corporate installation with elusive productivity goals. "I am not in the business of building three-year MIS systems," says Pedhazur. "I'm using the machine to bang out code the same day I buy it. I'd rather be banging out applications today than sitting here and worrying about the best hardware choice three years down the road."

If Pedhazur sounds like he's familiar with the argument about NeXT's viability, it's because he's faced it before. Previously, both Pedhazur and Goldstein worked at First Boston Corporation, where they brought in over 50 NeXT workstations to the equity derivatives department. UBS Securities hired the team away when it decided to enter the derivatives business.

> *"Decisions have to be made in seconds. If [competitors] decide before you, you lose."*

Equity derivatives are a new type of financial instrument whose value is based on multiple stocks and can thus be overlaid on a portfolio of stocks to guard against market declines. Superior equity derivatives programs track inefficiencies in key marketplaces–a task requiring computers to perform quick calculations and to display fields of numbers and graphs that highlight sudden changes. The margin for error on trades that typically reach hundreds of millions of dollars is nil. With many trades, decisions have to be made in seconds. And since competitors are watching similar screens, "if they decide before you," says Pedhazur, "you lose."

For UBS, it wasn't a question of choosing NeXT over another machine. "Before we came in, we told them, 'Here are some of the things we can do,'" says Pedhazur. "'If you want them done, NeXT is the box we suggest.'"

NeXT's proven speedy development cycle was the main reason they felt the job couldn't be done on another workstation. "You get a machine whose heart and soul is object oriented," says Pedhazur. "The tools that come out of other companies don't stand up."

Companies that choose another hardware environment, says Pedhazur, are having to start from the ground up. "Every single one is building their own tools in-house," he says. "*That's* a risk that isn't worth it to me."

Because custom applications are driving the use of NeXT at UBS Securities, programmers are central to the bank's strategy. A team of five programmers that reports to Pedhazur is developing the trading systems. All have experience building equity-trading systems, and four of the five have had one or more years programming on NeXT.

Though the applications are custom, Pedhazur says the risk isn't as great as it might seem. Models are created to analyze whether a type of trade will be profitable long before they go to the trouble of writing the entire application. He prototypes program-arbitrage systems in Mathematica and risk-analysis and options-arbitrage systems in Wingz.

At the time of this writing, the NeXT workstations had been at UBS Securities for only three weeks. Nevertheless, the schedule called for prototypes in two months, and production software in three to four months. Installed on the company's Ethernet TCP/IP network, the workstations will ultimately connect with UBS Securities' range of UNIX workstations and IBM mainframes.

If everything goes as scheduled, the software will be a competitive advantage for UBS Securities and a shining example for NeXT. "Any significant improvement in application development can have tremendous bottom-line results," says Cummings. "The trouble is that it's hard to quantify and hard to prove."

At the same time that NeXT is getting a chance to prove its mettle in custom software, standard applications have already begun to make inroads. Mathematica is a favorite of company theoreticians, while document creators appreciate FrameMaker's fluid integration of text, mathematical equations, and graphics. Diagram! is being used to create org charts and presentations and to diagram object hierarchies.

At present, UBS Securities has 14 fully loaded NeXTstations. Pedhazur anticipates buying one or two Cubes as department servers, and he may buy a few 8MB Stations for traders who need only a few applications.

While Pedhazur and Goldstein are satisfied with the early progress of the project, they realize that, like most deals on Wall Street, the bottom line will rule. "If we are successful, we will be forced to bring on more machines," says Pedhazur. "If we are unsuccessful, there won't be any more."

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O'Connor & Associates

Location: Chicago
Application: Office Automation
Hardware: 200 NeXTstations and NeXTcubes
Key software: NeXTmail, Improv
Goal: Improve communications and productivity with NeXT systems as standard workstation

While other securities firms are employing NeXT for primarily custom applications, one of the largest NeXT financial installations is concerned less with programming than with old-fashioned productivity.

"Custom development is important, but in the initial part of our project it's almost secondary," says Robert Wilen, O'Connor & Associates' vice president, Technology Division, and NeXT project manager. "We want to get PC and Mac users onto the same type of technology: to give them a better networked, common PC."

The Chicago options and trading firm has always been an aggressive user of technology. Before making the decision in December 1990 to make a major NeXT purchase, O'Connor & Associates already had more than 400 Sun workstations installed for proprietary development and an equal number of PCs and Macs used for general productivity.

In NeXT, O'Connor saw a blend of workstation and PC technology. "NeXT was the first machine to provide 80 percent of what PCs and Macs provide *and* 80 percent of what the Suns provide," says Wilen.

The financial firm was impressed by NeXT's existing productivity applications. The UNIX orientation meant the machines would fit in with the company's TCP/IP Ethernet network and provide the immediate benefits of sharing files and electronic mail. And despite NeXT's upstart status, the machine represented a chance for O'Connor to unify its computer architecture.

Individuals in the firm had been buying large quantities of PCs and Macs. By offering them something they were unlikely to buy on their own, O'Connor hoped to bring rationality and planning to the company's technology direction. The company also hoped to give employees an attractive reason to gravitate toward the UNIX standard.

"Our idea is that the technology has to be compelling," says Wilen. "We don't want to cram NeXT down peoples' throats. It's a slick black machine people want on their desks."

The focus on office automation, as opposed to custom financial programs, drove the 200-workstation purchase. "You need a critical mass," says Wilen. "You need to get the whole management group up and running. Until you do that, a manager won't use it."

NeXT could replace the mishmash of computers that clutter a typical trading desk.

Similarly, the thinking behind signing a major deal with NeXT was equally long-term. "A purchase of that size gave us a chance to be a significant customer of NeXT, to get some specific attention," says Wilen. "That strategy was right on the money."

Being a big customer has meant help from NeXT in designing and integrating O'Connor's NeXT network with its existing Sun network. Wilen also believes O'Connor has benefited from its product-development briefing by NeXT and close relationships with major software companies, such as Lotus and Frame Technology.

Those benefits would have been impossible from other vendors. "IBM and Compaq would laugh at a 200-machine order," says Wilen.

Another reason that O'Connor didn't buy PCs or Macintoshes is that the company felt NeXT's basic capabilities were superior. "Why not IBM or Mac?" asks Wilen. "Because the multimedia integration they're still talking about on the Mac and IBM is here today on the NeXT."

Early on, Wilen was almost embarrassed about O'Connor's "mundane" strategy for office automation. "In trading firms, traders get all the attention," he says. "We have bigger plans. We're including managers, secretaries, accountants, and lawyers. "Decision making and communication is what it's all about," he says. "We're giving them a tool that helps them do that."

The biggest success so far has been NeXT's electronic mail. "People who work on different floors can now work on an Improv spreadsheet and mail it up and down," he says. "The ability to say, 'Hey, I filled up Section 3 it's your turn on 4,' is saving people hours." Wilen says that electronic mail will prove critical for the company's international offices in London, Zurich, Geneva, Frankfurt, Tokyo, and Singapore.

Other important applications at O'Connor besides Improv include Wingz, FrameMaker, Diagram!, and TopDraw. And despite Wilen's low-key talk, O'Connor is doing its share of custom work. Five programmers started with "a clean sheet of paper" and wrote a fixed-income trading program with NeXTstep in a scant two and half months. The program was installed in the London office in May 1991 and scheduled to begin trading at the end of that month.

In Chicago, O'Connor has a pilot project with Global Vision of Palo Alto's ADapti, a market data viewing product currently on the Mac and the SPARCstation that is being ported to the NeXT. The company is also evaluating ticker plant software that feeds and consolidates data from Reuters, Knight-Ridder, and Telekur, offered by MarketView Software of Chicago. Installation of the workstations began in December, and 80 were up and running by April. All 200 are scheduled to be installed by Labor Day.

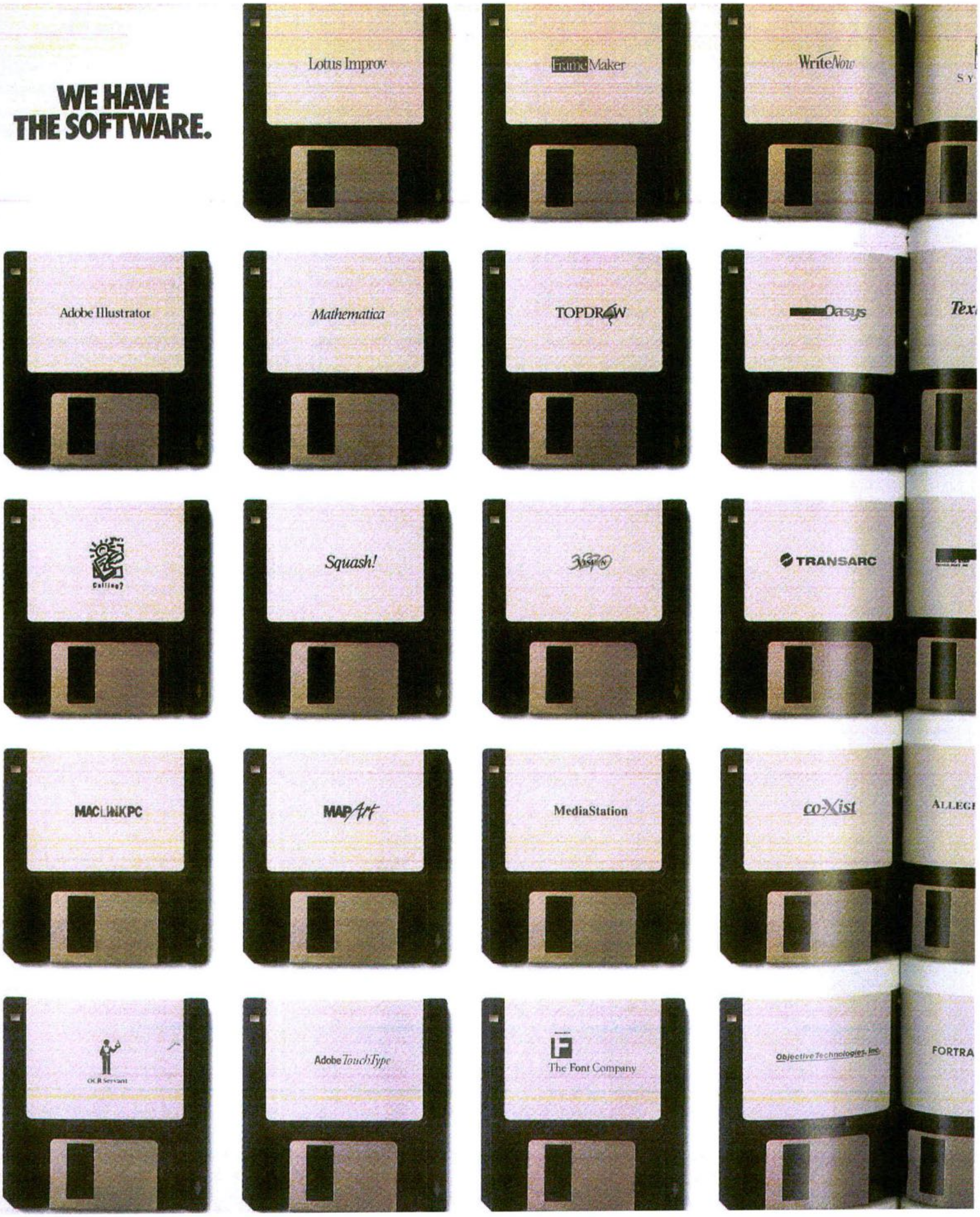
If Lehman Brothers and UBS Securities are proof that NeXT has the flexibility and muscle to tackle financial markets, then O'Connor suggests that the promise of those successes may earn NeXT a chance to play in more than just the trader's pit.

"Our game plan was to prove to traders that we had a product that was competitive," says Cummings. "Once you establish that, you can go into traditional PC applications. All Wall Street firms have legal departments, managers, and mergers and acquisitions departments. All of them need electronic mail, and all of them do a tremendous amount of work with spreadsheets."

Just ask Robert Wilen. Nobody's embarrassed anymore. ◆

JONATHAN LITTMAN *is a San Rafael, California, writer whose articles have appeared in* Forbes, California Magazine, *and the* Village Voice.

WE HAVE THE SOFTWARE.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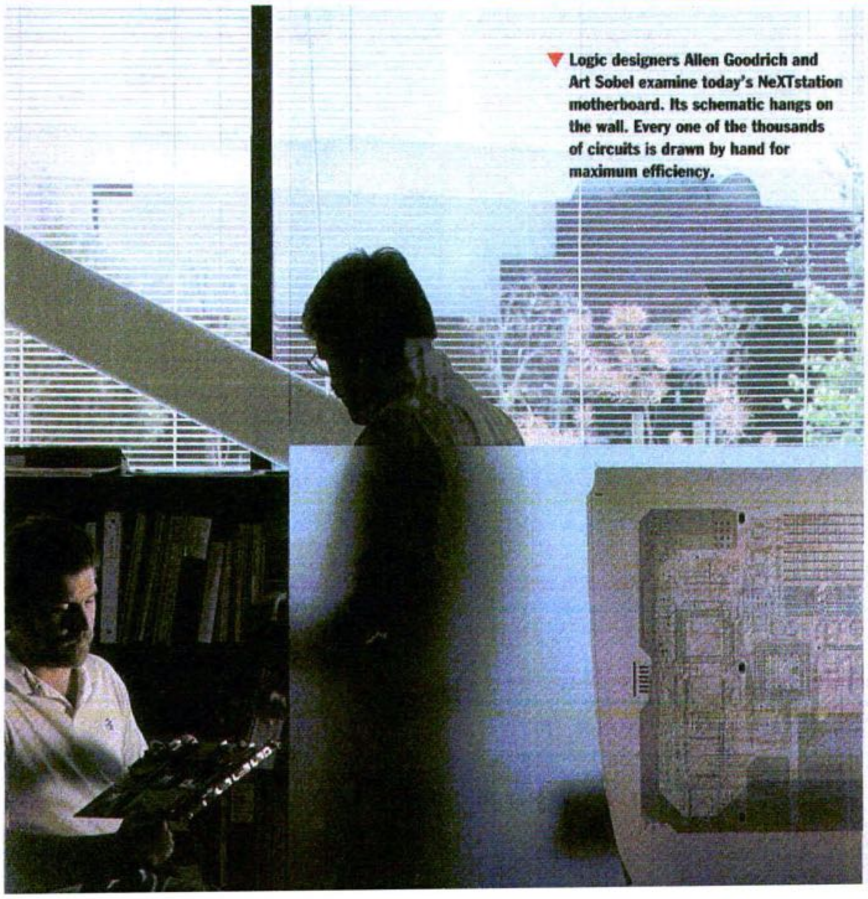
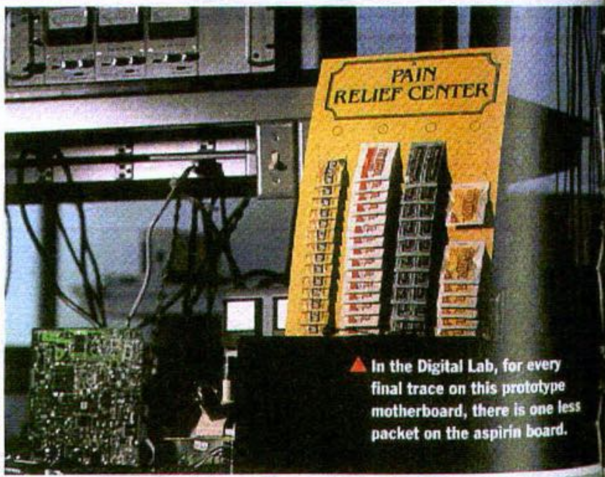
THE QUESTION IS,
DO YOU HAVE
THE COMPUTER?
NeXT

Circle 15 on reader service card

NeXT doesn't talk publicly about competative machines, but they certainly have one of each in the software configuration lab, where engineers test future NeXT systems for software compatibility across mixed networks.



Logic designers Allen Goodrich and Art Sobel examine today's NeXTstation motherboard. Its schematic hangs on the wall. Every one of the thousands of circuits is drawn by hand for maximum efficiency.



In the Digital Lab, for every final trace on this prototype motherboard, there is one less packet on the aspirin board.

To the guys in the Analog Lab, digital is just so much sand and

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A Peek Inside The NeXT Product Labs

Beyond the high-style public face of NeXT headquarters lies Building 2—a domain few outsiders ever see, filled with engineers few ever talk to. Like Willy Wonka's chocolate factory, it seems no one ever goes in and no one ever comes out. The blackout on visitors permits a wide-open environment inside: Engineers can freely exchange ideas without fear of disclosing company secrets. Here, under the direction of hardware guru Rich Page and software wizard Bud Tribble, NeXT's unsung heroes toil through late nights to invent the future of interpersonal computing. For the first time, Page and Tribble agreed to lift the veil for this photo tour of the NeXT product labs.

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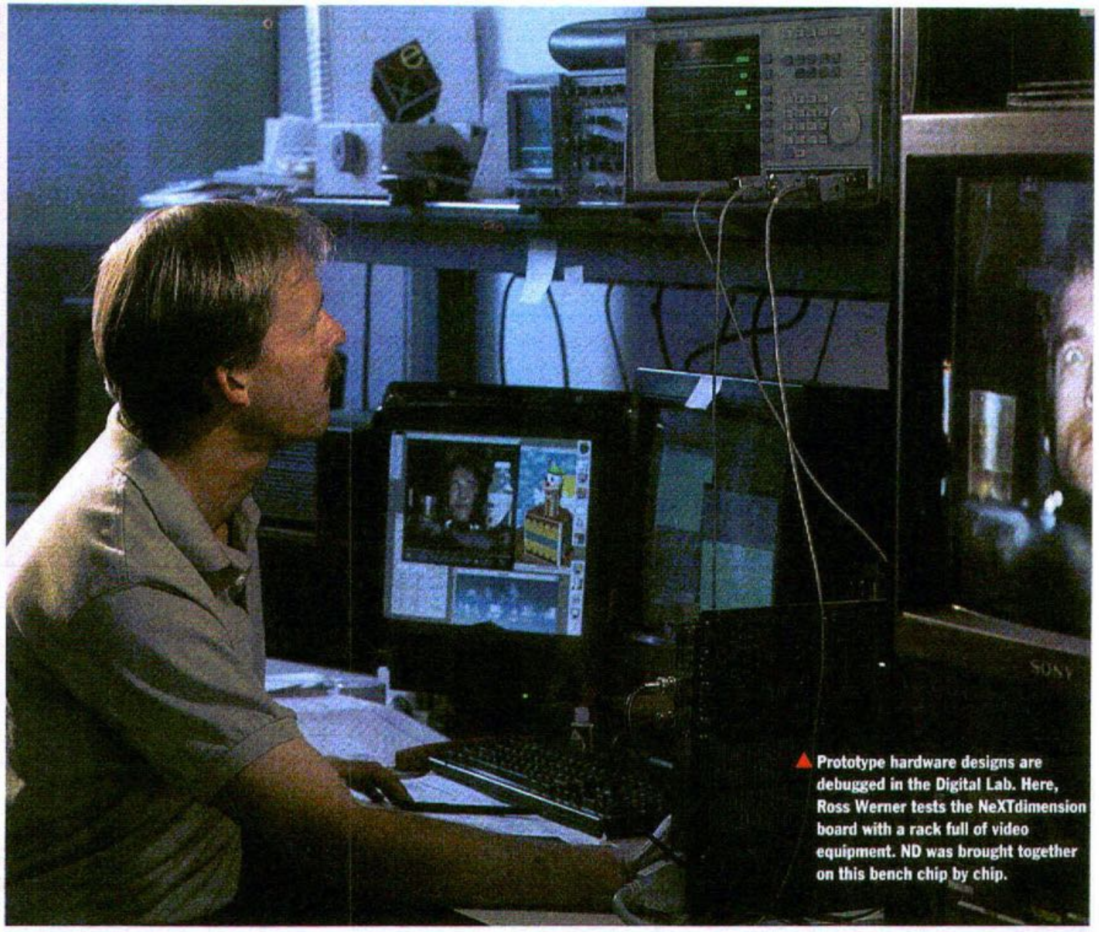
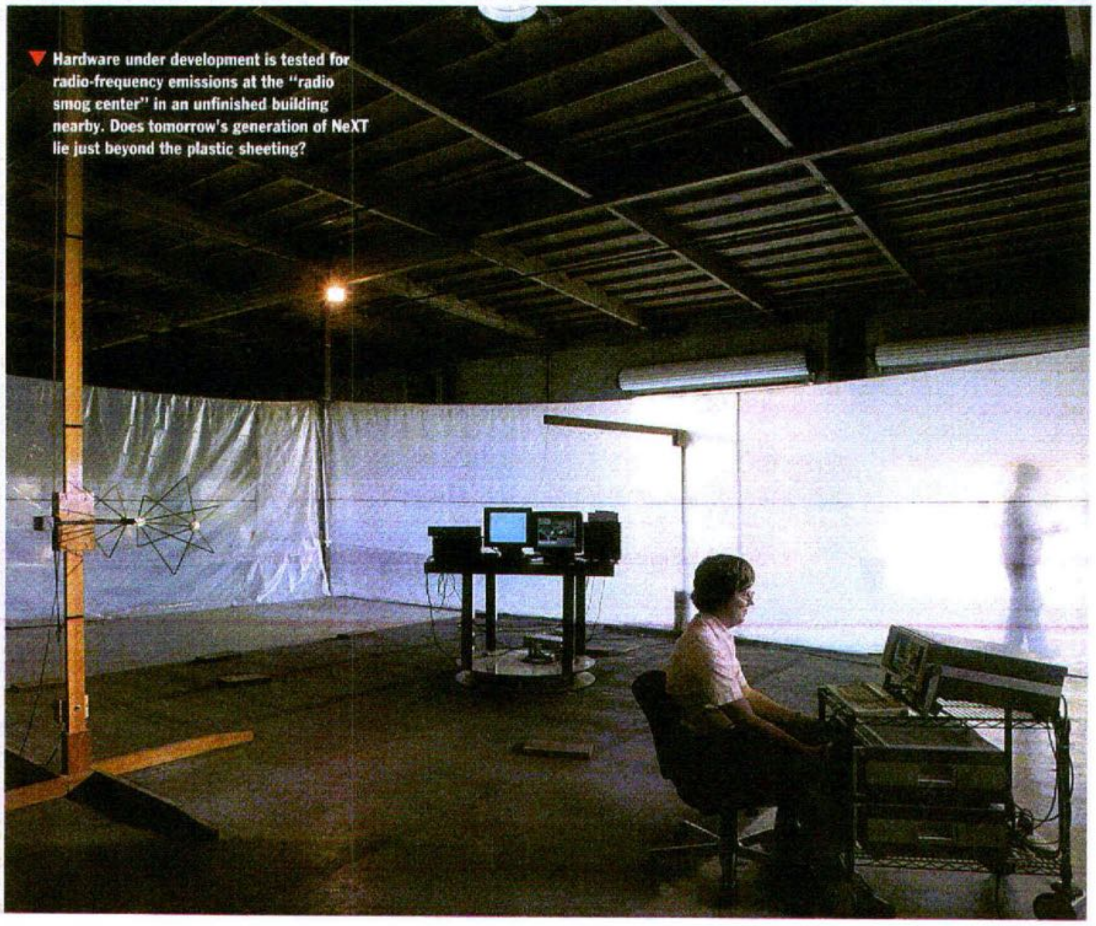
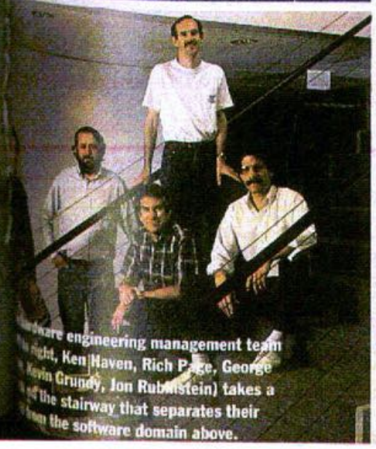

▲ Prototype hardware designs are debugged in the Digital Lab. Here, Ross Werner tests the NeXTdimension board with a rack full of video equipment. ND was brought together on this bench chip by chip.


▼ Hardware under development is tested for radio-frequency emissions at the "radio smog center" in an unfinished building nearby. Does tomorrow's generation of NeXT lie just beyond the plastic sheeting?


ware engineering management team
ight, Ken Haven, Rich Page, George
Kevin Grundy, Jon Rubinstein) takes a
the stairway that separates their
the software domain above.

The Great Write Hope

WordPerfect's new NeXT version straddles the middle ground between WriteNow and FrameMaker

by ROBERT LAURISTON

WordPerfect's arrival on the NeXT is newsworthy in several ways. It's the first fully WYSIWYG version of the most popular word processing program and the first leading application to be rewritten for Mach/NeXTstep. It's also the first full-featured word processor for the NeXT.

WriteNow is fine for knocking out short memos and letters, or even merging data for a mass mailing. But its graphics and text-formatting skills aren't really adequate when you want to put together a slick newsletter or presentation, and it doesn't handle long documents well. Until now, the only other choice available for such jobs was FrameMaker–a complicated, hard-to-learn program aimed at organizations putting out long, structured documents like manuals and catalogs.

With the appearance of WordPerfect, the NeXT word processing picture is starting to look up. The program combines the powerful features of WordPerfect 5.0 for UNIX (basically the same program as the WordPerfect 5.0 familiar to millions of DOS users) with the NeXT's graphical ease and PostScript imaging. While not the earthshaking innovation that NeXT might like you to believe–it's not as powerful as WordPerfect 5.1 for DOS, and several Mac and Windows programs are better graphical word processors–it's an impressive product, and a welcome addition to the NeXT's software selection.

Port of call

One of the program's biggest advantages is the name on the box: WordPerfect is synonymous with word processing for millions of PC users, and it is the word-processing standard in most offices. The NeXT version isn't quite as powerful as its DOS cousin, since it's based on 5.0 code rather than 5.1. That means there's no context-sensitive help, table editor, IF/THEN/ELSE mail-merge, or formula layout. It does have 5.1's Justify command, which lets you center or right-align selected paragraphs, not just single lines. Somewhere along the porting path some 5.0 features got lost, too: there's no interactive tutorial, macro programming language, or directory-wide text search. Otherwise, the program's capabilities are essentially identical to those of WordPerfect 5.0 for DOS.

It's a tribute to the skill of WordPerfect's programmers that they were able to turn a decidedly text-oriented program like WordPerfect into a WYSIWYG word processor. Unfortunately, holdovers from its character-mode past make WordPerfect for the NeXT quirky, confusing, and sometimes hard to use.

The biggest problem is the use of hidden codes for formatting. When you format a selection, WordPerfect inserts a code at the beginning of the block, and often at the end, too. The only way you can see what codes are in your document is by splitting the window horizontally between the regular display and the Format Inspector, a confusing and decidedly non-WYSIWYG view of the document that's required for some basic tasks. Another effect of this code-oriented approach is that many commands don't work the way they do in other NeXT programs. For instance, deleting a heading can change the font in the following paragraph.

As a result, anyone not familiar with WordPerfect 5.0 on the PC will sometimes find simple tasks daunting. Let's say you define a center tab on the ruler while preparing a chart. If you look in the Format Inspector, you find that text entered in the column is bracketed by center and end-align codes. If you later change the tab stop to a regular left tab, the previously typed text stays centered. To straighten it out, you have to delete the center code and type a new tab in every row of the chart.

Code-related problems affect many other features, including columns, kerning, and named styles. This stuff is bad enough under DOS; in a graphical environment, it's absurd, especially considering the specific example above was solved in 1989 by WordPerfect 5.1.

To fix this problem, WordPerfect should hide the gory details of formatting from the user. Since formats are associated with recognizable elements on the screen–characters, paragraphs, hard page breaks–the codes are redundant. WordPerfect for the NeXT does take a few steps in the right direction. Unlike its DOS counterpart, if you try to put format codes that belong at the beginning of a paragraph or the top of a page in the wrong place, or try to nest codes in the wrong order, the program usually puts them in their proper spot. All that's left is to make all the codes–and the insertion point–smart enough to go where they belong, then eliminate the Format Inspector.

WordPerfect 5.0

◆ ◆ ◆

WordPerfect brings high-end word processing to the NeXT, with named styles, multicolumn formatting, and sophisticated graphics treatments. Ported from the company's WordPerfect 5.0 (not 5.1) for UNIX, its character-based roots show in its embedded formatting codes. Lack of Undo is a serious flaw. WordPerfect Corporation's track record of speedy fixes promises future improvements of an already strong product.

$495

WordPerfect Corporation,
1555 N. Technology Way,
Orem, UT 84057. 801/225-5000,
801/228-9910 (NeXT support)

Big fish, small pond

Okay, so WordPerfect breaks little new ground in word processing, or even in GUI word processing. But we still have every expectation that WordPerfect will add some hefty new tools to the NeXT's software workbench, right? Well, it does indeed. Once you get used to working with the hidden codes, WordPerfect has many advantages over WriteNow, particularly when you move beyond simple text formatting toward desktop publishing, or when a group of people are working together on a single document.

Want to put together a newsletter, flashy report, or impressive presentation? WordPerfect's flexible column layout (you can start and stop columns within a document and adjust their widths individually), ability to wrap columns around graphics, free-floating text boxes for sidebars, and line drawing are up to the job. You can import graphics via the pasteboard, or simply drag their icons across the desktop and drop them onto your document. WordPerfect also supports NeXT's services, so functions from other programs such as Create!, Grab, and Librarian are available from within WordPerfect. Small caps, shadow, and outline text attributes (in tasteful moderation, please) help dress up headlines.

Although the hidden codes can be confusing, page layout is much easier than with FrameMaker or with character-mode versions of WordPerfect. When you run into problems, WordPerfect's knowledgeable telephone support staffers will walk you through difficult tasks (phone support is free).

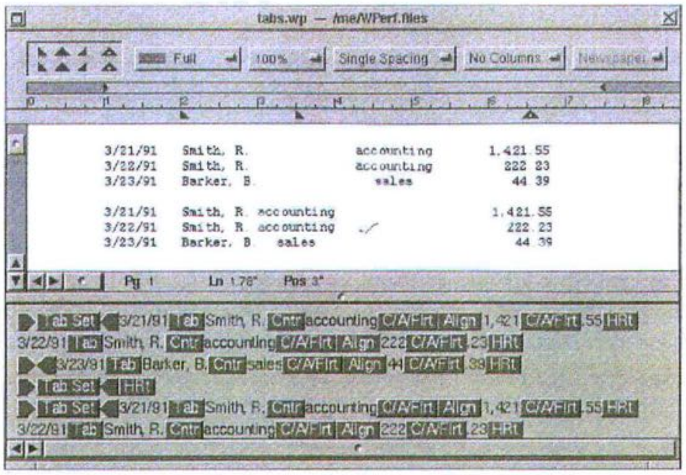
When working on books or other long documents, you can break them up into separate subdocument files to be edited by various people on your network, then use WordPerfect's Master Document feature to consolidate them automatically for printing. Other long-document features let you mark text for automatic generation of your table of contents, list of figures, bibliography, and index. You can also define automatic cross-references to keep your manuscript up to date as footnote, table, or illustration numbers change. You can mix portrait and landscape pages in a single file—very handy when you want to include a wide chart in the middle of a document.

Named styles let you reformat globally. For instance, you can change the font of all the headings in a document with a single command. You can also define a library of named styles, which can be shared by everyone on your network. Since styles can contain both formats and text, you can use them as form templates, say for generating letterhead on your laser printer or printing your return address on envelopes.

For tracking revisions, WordPerfect can compare the document on-screen with one on disk, redlining all new text and striking out deletions. However, the utility's usefulness is limited by its phrase-by-phrase comparison–change one word in a sentence, and Compare strikes out the whole thing, then inserts a redlined version with the changed word. You can also mark redlined or struck-out text manually. Once the revised document is approved, a single command will strip out all struck-out text and remove all the redlining codes.

WordPerfect does not yet support Lip Service, but you can add typed comments to WordPerfect documents without actually changing the text by adding pop-up comments. They appear in the margin as cartoon balloons; clicking on one pops up a larger balloon containing the comment. A pointer to the specific spot in text where you entered the comment makes it clear to what it refers.

While this program doesn't have the DOS version's programmable macro language, its macro capabilities are otherwise excellent. You can record any sequence of keystrokes or commands, then clean it up in the built-in macro editor. Alternatively, you can just open the editor and start writing a new macro from scratch. You can load your favorite macros onto the program's menu, then tear them off and leave them on the desktop for single-click access. You can also assign macros to unused Alternate keys (unfortunately only 21 are free).



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3/21/91   Smith, R.              accounting      1,421.55
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3/23/91   Barker, B.               sales            44.39

3/21/91   Smith, R. accounting                   1,421.55
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[Tab Set]3/21/91[Tab]Smith, R.[Cntr]accounting[C/A/Flrt][Align]1,421[C/A/Flrt].55[HRt]
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WordPerfect's code-oriented approach to formatting can make it hard to work with tabular charts. The second set of three rows shows what happened when we changed the stop for the third column from a center tab at 4.75 inches to a left tab at 3.5 inches. The items in the third column centered around the 3.5-inch stop.

Clicking on the cartoon balloon in the left margin pops up this nonprinting comment.

WordPerfect's Column feature lets you create multiple wrapping-text columns in a chart.

WordPerfect will import documents in several formats: text, RTF (Rich Text Format), RTFD (Rich Text Format with embedded graphics), or WriteNow files. It shares a common file format with WordPerfect 5.0 on other platforms, so you can exchange files painlessly with co-workers running DOS or UNIX versions of the program. You can even edit WordPerfect 5.1 files without harming them, though unsupported features like tables or formulas will display oddly, if at all. Sharing files with NeXT users who don't use WordPerfect is a problem, though: you can only save in WordPerfect format or as plain ASCII text.

Other miscellaneous goodies include the ability to append to the pasteboard, timed backup, password encryption of selected documents, a spell checker, and an on-line thesaurus. Unlike other versions of WordPerfect, you can select multiple tabs in the ruler and move them en masse, and there's no confusing dormant hard return—when a blank line would fall at the top of a page, it's just moved to the bottom of the previous page.

Short of perfection

WordPerfect's documentation and on-line help could use some improvement. All you get is one page of installation instructions, a short training book, and about a megabyte of WordPerfect documents that briefly cover most of the features. While distributing documentation on disk is a reasonable approach, some of it is sketchy. (You'd probably have to get a DOS WordPerfect 5.0 manual or one of the many third-party books before you could use the arcane mail merge codes.)

WordPerfect's Help utility is imperfect. It opens the help text as a WordPerfect document instead of having a dedicated help window. You can browse help topics alphabetically or hierarchically, but you can't search, so it's often hard to find what you want. A better solution is to install the docs in the Digital Librarian and skip the built-in help. One thing that needs to be added is a listing of the codes in the Format Inspector, since some of them have cryptic labels that don't clearly indicate what they are.

WordPerfect's misnamed Outline command is not like the collapsible, hierarchical outliners you might have used in other programs. It's little more than automatic paragraph numbering.

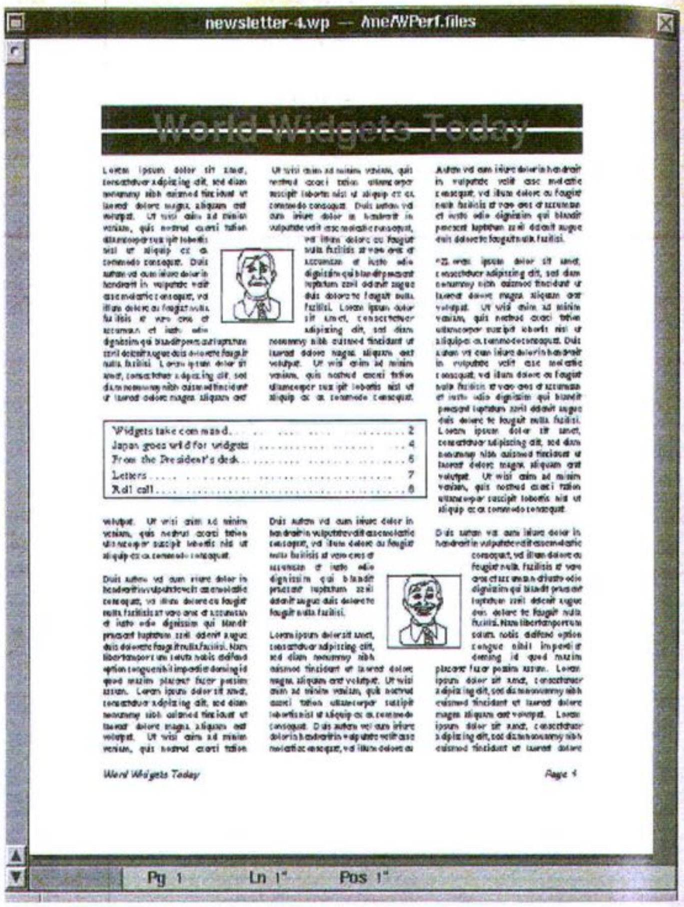
We encountered a few bugs in 1.0.1. Setting fonts is occasionally flaky: once in a while what you see on the screen doesn't match what you see in the font panel, and changes to multiple font selections don't always do what you'd expect. When typing at the end of a line, words sometimes run together, or the first letter of a word ends up at the end of the previous word. If you double-click a WordPerfect document in the workspace after you start the program, it opens, but the menus don't appear. Considering how fast the company cleaned out the many bugs we found in release 1.0, these minor problems may well be fixed by the time you read this. Be sure to call WordPerfect tech support and ask for the latest version.

Several other bugs are longstanding WordPerfect problems carried over from DOS, so there's no telling when they'll be fixed. Blank spaces before a hard return can wrap to the next line, putting an extra blank line between the paragraphs. The word count utility ignores numbers. In the that's-not-a-bug-that's-a-feature department, when you suppress page numbering on the first page of a document, the bottom margin drops down to where the number would have been. (The workaround is to use two overlapping footers, one of them a dummy. But didn't you buy a NeXT to get away from that kind of nonsense?)

Contender or champ?

While all those useful features give WordPerfect quite an edge, WriteNow still has a few advantages. WriteNow's Undo is far superior to WordPerfect's Undelete, which simply pastes whatever you last deleted at the current insertion point (not back from where it was cut). In WriteNow, copying formats is as simple as pasting a ruler; in WordPerfect, you have to block and copy a group of hidden codes. This is made more difficult by the fact that you can't click and drag to select a block in the Format Inspector, so you have to use the Alternate and cursor keys instead. WriteNow has smart quotes, while WordPerfect makes you type them in manually.

The two programs proved equally fast at opening and saving documents, scrolling, editing, and reformatting. The one major difference was the Replace All command used in a large document. WriteNow took nearly six times as long as WordPerfect and couldn't handle the task on documents over a certain size (around 80K in our tests)–though it can undo the operation, while WordPerfect can't. WordPerfect's formatting codes seem to take up more space than WriteNow's. Text-only files from the two programs take up about the same amount of disk space, but heavily formatted WordPerfect documents can take twice the space of equivalent WriteNow files.



Widgets take command.......2
Japan goes wild for widgets.......4
From the President's desk.......6
Letters.......7
Roll call.......8

Columns, free-floating graphics, lines, and text boxes let you lay out simple newsletters. Notice the dot-leader tabs in the table of contents.

To hear Steve Jobs tell it, WordPerfect for the NeXT is the greatest word processing program in the world. Is it? Well, not quite. While it does offer a host of nice (though not innovative) features, it's a few steps behind its DOS counterpart, and its code-oriented approach makes it harder to learn and use than other graphical word processors.

But there's no need to exaggerate WordPerfect's virtues, which are quite adequate to make it a very welcome addition to the NeXT user's toolbox. It's a far more capable word processor than WriteNow and a much easier page layout program than FrameMaker. Unless WriteNow does everything you need, WordPerfect for the NeXT is well worth its modest cost.

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Does One Frame Fit All?

The only page-layout program on the NeXT, FrameMaker is best suited for long documents

by HELMUT KOBLER

Frame Technology's FrameMaker has a lot riding on its shoulders. As the only page-layout program currently available for the NeXT computer, it has to pack plenty of features and functionality. FrameMaker's product literature portrays the product as the virtual Veg-o-matic of publishing: good for producing everything from memos, brochures, and newsletters to lengthy technical manuscripts and documentation.

FrameMaker can indeed be used for the entire gamut of publishing projects, but its complexity and design limitations make it unsuitable for highly designed, unstructured, four-color work. FrameMaker is, however, a formidable tool for working with structured documents–publications with similar formats from page to page, such as manuals, catalogs, and books–especially in multiplatform, networked offices. If it's not the ultimate page-layout program, don't blame Frame. It has declined to shoulder the entire burden for page layout on the NeXT, opting instead to fulfill a specific niche across many platforms.

Structured thinking

FrameMaker, as its name implies, uses what Frame Technology terms a "frame" approach to publication design: you draw, or let the program draw, rectangular frames on a page, then place graphics and text into them. Designing a layout in FrameMaker starts with its master pages, where you set up column formats and elements (such as rules and page numbers) that will appear on every page. You can create up to 25 master pages per document so that you can quickly switch between predefined, custom layouts. For example, you could have one layout for a title page and another for a standard three-column page with a sidebar. With a basic layout established, FrameMaker automatically flows text from column to column and page to page.

While master pages control each page's design format, FrameMaker's text "tags," also known as style sheets, are your main controls for formatting a document's text. Tags are collections of FrameMaker's text styles and formatting information such as font, size, style, alignment, hyphenation and justification, kerning, leading, indents, tabs, and so on. You'll create a distinct tag for every text element in your document: body text, chapter titles, headlines, subheads, and footnotes. You can quickly apply these predefined formats by selecting some text and then picking the appropriate tag from the tag list. You can update the text later (for example, changing all subheads from Helvetica to Times) by simply changing the tags.

FrameMaker's tags have two other notable features. First, you can create tags that affect whole paragraphs or character tags that apply only to parts of a paragraph. Second, tags can include graphics. For instance, you can specify that a chapter heading tag will always print a company logo beneath it.

Good references

FrameMaker manages all the elements that are potential headaches for long-document publishers: a table of contents, lists of figures, indexes, and cross-references. One significant feature is FrameMaker's automatic paragraph numbering. (Neither of the page-layout pacesetters, PageMaker and Quark XPress, have this feature, although the PC standard for long documents, Ventura Publisher, does.) This handles all the numbered chapters, headings, and subheads that might divide a document. For instance, you can set FrameMaker's numbering scheme to label a section as 2, followed by related paragraphs called 2-a, 2-b, and so on, which in turn lead to subpoints 2-a-1, 2-a-2, and so on. FrameMaker can also number graphics and tables (1.1, 1.2, 1.3). If you later add, delete, or rearrange these paragraphs or graphics, the program automatically renumbers everything to reflect the change.

FrameMaker 2.1

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A sophisticated page-layout program with built-in word-processing and graphics features, targeted at departments that publish book-length documents. FrameMaker's huge feature list makes it capable of, though not ideal for, almost any kind of job. In the interest of maintaining cross-platform compatibility, it passes up the opportunity to take advantage of NeXT's unique abilities.

$995

Frame Technology Corporation,
1010 Rincon Circle, San Jose, CA 95131.
408/433-3311, 800/843-7263,
408/433-1928 fax.

Another of FrameMaker's appreciable talents is cross-referencing. A special panel lets you set up a reference to a passage, heading, or graphic with wording like, "See Item XYZ, section 1.2.4, page 24." From then on, FrameMaker keeps that reference accurate, updating it to reflect any later changes in the reference's name, section number, or page number. You can similarly mark chapter titles, section and subsection headings, and even titles for tables and graphics, to appear in a table of contents or list of figures page.

Likewise, FrameMaker will compile marked text into a thorough index. It can index entire passages, under more than one word. For instance, a discussion on DNA can be indexed under *DNA, genetics,* and *Genentech.* It can make hierarchical entries such as *dogs* and *cats* under the heading *animals,* and finally, make cross-references to guide readers to other related index topics. FrameMaker even lets you make multiple indexes in the same document–say, one for subjects, one for authors, and yet another for graphics and figures.

For large projects, you'll want to create chapters as individual FrameMaker documents, partly to keep file size down and the program running fast, and to enable a staff to easily divide up the work. In any case, you'll use FrameMaker's Book command to bring all of these separate files into one document. Through a panel, you choose which files to link, and in which order. FrameMaker handles the rest, automatically renumbering chapters, sections, graphics, and pages, and updating all the combined cross-references in these documents. You can just as easily rearrange the order of chapter files–in case you decide to change Chapter 2 to Chapter 4–and FrameMaker updates everything accordingly.

One for all

Unlike most page-layout programs, FrameMaker provides an all-in-one publishing package with both a built-in word processor and a graphics program. You and your staff can create most of your publication's elements with one convenient program. On the word processing side, FrameMaker's sharp spelling checker, find-and-replace feature (which recognizes text styles), automatic hyphenation, macros, and extensive footnote options will often be all you'll need to compose text.

The program also provides some high-end features. With FrameMaker's variables, you can place generic references throughout a document, such as "date," or "chapter title," and then later define the values for these variables. FrameMaker will update them globally or individually.

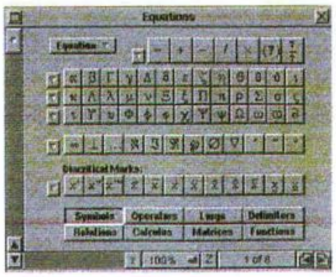
In version 3.0, due this fall, FrameMaker will add an impressive conditional text feature. By tagging text with conditional tags, you will be able to instruct FrameMaker to display and print some paragraphs and to hide others. Among other things, this will allow you to design a basic layout for, say, a software manual, and then, through conditional tags, create different text for NeXT, Mac, and PC versions. To print each respective edition, you'll just tell FrameMaker which conditional tags to recognize.

FrameMaker also includes special features for building tables and formatting scientific equations, simplifying the production of technical documents that often call for such items. The program's table editor makes easy work of adding, deleting, rearranging, and resizing columns and rows–as if you're working with the flexible cells of a spreadsheet program. Version 3.0 will also merge columns, and let you spruce up tables with various border rules and fills. Putting together equations in FrameMaker is a matter of pointing to and clicking on an expression in the equation palette (and several sub-palettes) and then typing the values you want to plug in. This is a welcome departure from the cryptic typesetting codes that most word processors use for equation editing.

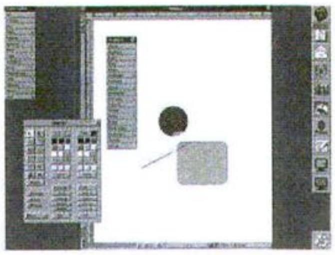
FrameMaker can wrap text around the rectangular frames holding graphics, but it can't do the same around the image's actual contours–one of the program's design limitations. On the plus side, FrameMaker lets you anchor graphics to any point in a text column–perhaps you want to link an illustration to a related section heading–so the two elements stick together, no matter how much the text may move during layout. Unfortunately, you can't similarly anchor a text frame, such as a pull quote or a caption.

If you do use another program to prepare text, or if outside writers submit copy in other formats, FrameMaker imports ASCII, WriteNow, and Rich Text Format (RTF) files. Using RTF, you can also bring in files created by PC and Mac applications such as Microsoft Word and WordPerfect, although some formatting, such as style sheets, won't transfer.

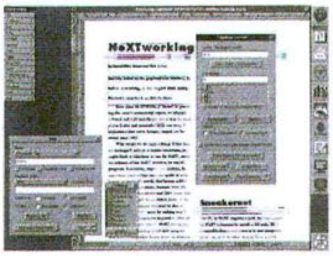
FrameMaker's built-in, object-oriented graphics tools are comparable to those of a meat-and-potatoes drawing program such as MacDraw II. FrameMaker lets you draw all the standard shapes (circles, ovals, rectangles, rounded boxes, arrows, freehand lines, Bezier curves, etc.), with 15 fill or pen patterns. A host of graphics editing features include object grouping and alignment, text and graphics rotation in 90-degree increments, and horizontal and vertical flipping. If you require high-end illustration functions such as special PostScript fills, single-degree rotation, layer control, object merging, special text effects, and so on, you can always turn to programs such as Adobe Illustrator or Media Logic's Top Draw. FrameMaker imports standard TIFF and Encapsulated PostScript (EPS) files from such applications on the NeXT, Mac, PC, and other platforms.



If your field is scientific and technical publishing, you'll like the simplicity of FrameMaker's equation palettes: Simply click on the desired expressions and functions in the palettes, and Frame inserts them.



FrameMaker's basic graphics functions include a variety of drawing tools, fill and pen patterns, arrow icons, and features such as flip, rotate, align, and grouping of objects.



FrameMaker packs a good deal of word-processing finesse: Its find-and-replace feature searches for style tags as well as characters, and the spelling checker keeps an eye out for repeated words and poor hyphenation as well as misspellings.

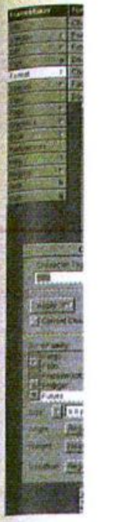
FrameMaker has a "hot links" feature to automatically update imported graphics when they're altered in their original program. This way, when a staff artist revises an illustration, a layout designer won't have to manually replace the graphic. Unfortunately, FrameMaker won't similarly make updates to imported text files, although this feature is on the company's wish list for a future program update.

Frame's soup-to-nuts approach to publishing reflects its origins in other platforms. The NeXT multitasking operating system and support of standard file formats, interfaces, and interapplication communication via services obviate the need for such all-in-one solutions. These features make it possible on the NeXT to run programs side by side and to pull in data, and even functions, from other programs whenever necessary. For groups focused on single tasks, though, such as a company's documentation department, learning just one program, and having only a single window to work in, could be handy.

For the workgroup

Frame recognizes that publishing long documents entails the cooperation of workgroups that might include a number of editors, copywriters, artists, and layout designers, all connected on a network. And that network might include different types of workstations. FrameMaker accommodates this kind of teamwork to a greater extent than do most page-layout programs.

FrameMaker has its own system of file permissions for network work, which overrides UNIX's system-level permission handling. If one person on the network tries to open a file that another person in the workgroup already has open, FrameMaker displays a message warning the second reader that someone else is working on the file. You are forewarned that you may lose any changes you make; only those changes made by the last person to work on the file are saved.



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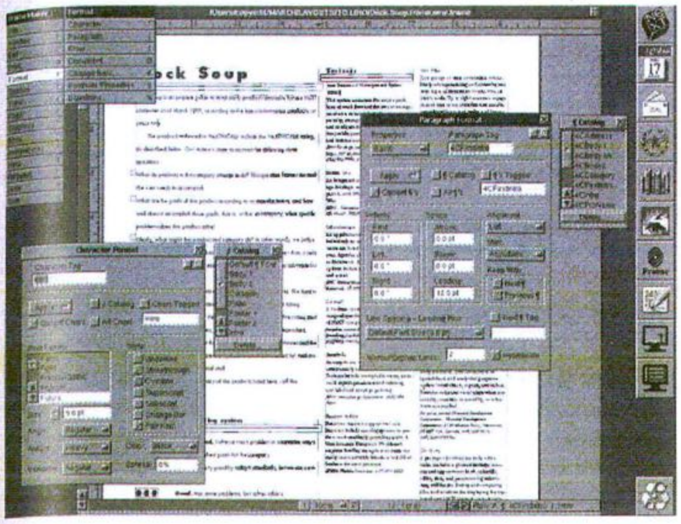


FrameMaker's Character Format and Paragraph Format dialog boxes are the keys to setting up the program's powerful text tags (style sheets), which define the formatting for all the text elements in a document. FrameMaker also uses these tags to quickly build indexes, a table of contents, and cross-references.

FrameMaker's Book command (described above) can assemble files from anywhere in a network: Chapter 1 can be on one machine and Chapter 2 on another. Frame spokespeople also point out that FrameMaker 3.0's conditional text feature should be useful for supplying comments by workgroup members on common documents. The editors' comments can be displayed or not, at the reader's choice, and each editor can use a different style (or color, on color NeXT systems) to differentiate between comments. (The NeXT's Lip Service voice annotation feature supplements that capability.)

Frame has versions of FrameMaker for the Macintosh, IBM RT, Sun, and other UNIX platforms, and Frame promises that the documents from each version are completely interchangeable. In other words, a FrameMaker book created on the Macintosh can be opened and edited on your NeXT, and vice versa. This is a real boon if your workgroup features a diverse range of hardware, because it lets you integrate the NeXT without sacrificing application standards and compatibility.

These workgroup features, though, won't solve all the complexities of workgroup publishing. Indeed, working over a network brings up a slew of issues that no page-layout application has yet addressed, such as setting file-access privileges for different members of a workgroup and tracking changes to a document. Separate programs, such as the upcoming Boss Document Management System from Boss Logic and PaperSight from VISUS, will. That FrameMaker includes any workgroup features is another example of its ambitious attempt to provide a complete set of tools for its target audience.

No designs on design

Although FrameMaker makes assembling and managing long documents easier, it's not the best solution for shorter publications. FrameMaker has the tools to produce simple brochures, newsletters, and advertisements, especially with its built-in word processing and graphics capabilities. But these kinds of publications don't require FrameMaker's powerful long-document features and don't justify the program's $995 price tag. Depending on the complexity of your publication's design, you might be just as well-off using WordPerfect instead. Besides, when you publish infrequently (a monthly newsletter, for instance), you'll want a fairly intuitive program that you don't have to relearn each time. Given FrameMaker's complexity, it takes some effort to learn, which makes it less than ideal for occasional use.

At first, you may feel overwhelmed by the multiple menus, submenus, dialog boxes, buttons, and other options. In tackling your first major FrameMaker project, expect to spend time flipping through the program's five manuals or regularly referencing its excellent on-line help system. If you don't specifically need FrameMaker's extensive features, they'll only get in the way.

Publications that focus on sophisticated, flexible design–some books, magazines, and glossy advertisements–will probably require features that FrameMaker doesn't have. FrameMaker does surprisingly precise typography for a program oriented to long-document production (point size and leading can be set in .001 increments, for instance), but it doesn't have type-scaling controls, which have become popular in packages such as PageMaker 4.0 and QuarkXPress on the Mac. Also, FrameMaker's inability to wrap text around irregularly shaped graphics would frustrate many designers.

A more serious weakness is FrameMaker's limited color handling, which prevents you from printing text and graphics with more than eight spot colors. This is perfectly adequate for documents that don't go beyond black-and-white laser printing, but other publications such as full-color textbooks, catalogs, and manuals, which FrameMaker is otherwise qualified to handle, need standard four-color separations. Given the interest nowadays in color publishing, and the fact that the NeXT is such an able color platform, we hope that FrameMaker will improve in this area.

FrameMaker 3.0 will add the conditional text and better table-handling features to the current package but not much else. (The upgrade will be free to FrameMaker 2.1 customers subscribing to Frame's Support Subscription and to all customers who have purchased FrameMaker 2.1 licenses between March 4, 1991, and the product ship date; otherwise, the upgrade price is $150.)

With its complexity and premium price, FrameMaker would be overkill for someone who publishes only memos, fliers, and brochures. WordPerfect could handle these tasks easily. Likewise, many publishers whose work demands color flexibility may have to wait awhile for the promised NeXT version of Quark XPress. (According to NeXT, XPress for the NeXT is due out next year.) Still, FrameMaker's huge feature list makes it capable, though not ideal, for doing a little of almost every kind of job. And if your work calls for long documents with large page counts, multiple chapters, tables, lists, illustrations, and indexes, then you won't believe your luck. For tackling these mega-projects, FrameMaker is as good as they come. ◆

HELMUT KOBLER *is the author of* Campus Computing *and a contributing editor of* Publish *magazine.*

OCR at Your Service

Optical character recognition (OCR) can be a wonderful thing: It takes scanned-in bitmaps of letters and numbers and converts them into editable chunks of ASCII text. The problem is that there is an almost infinite variety of ways to form characters, so that recognizing them reliably turns out to be an incredibly hard thing for a literal-"minded" computer to do well.

My previous experience with OCR, using Caere's OmniPage on the Mac to convert faxes to text, was discouraging. That's why I was excited by a recent NeXT technology demonstration that prominently featured the ability of HSD Microcomputer's OCR Servant to accurately read faxes.

Now, after putting OCR Servant through its paces for several days, I find that while it works well with high-quality scanned images, its recognition rate is not good enough for the vast majority of faxes I receive. Unfortunately, it seems that NeXT has promised more of OCR Servant than it can deliver. HSD, on the other hand, has been more restrained in its claims. I found that the product lived up to this more modest billing.

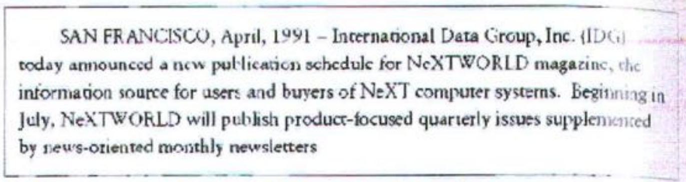
OCR Servant works well with images that use the 12 fonts and sizes (between 8 and 36 points) for which the software is optimized. It is also fast, processing documents about four times faster than OmniPage 2.0 on a Mac SE/30. Images can be generated by a scanner or a fax machine. It is in the area of faxes where OCR Servant's shortcomings become apparent.

Fax image clarity varies greatly with the method of generation. A fax can be generated either optically, by a fax machine, or by a computer, using a fax modem. Both fax machines and modems are able to transmit either in standard mode (100 by 200 dots per inch) or fine mode (200 by 200 dots per inch). Unfortunately, since fine mode doubles the transmission time, most faxes are sent using standard mode.

I tested OCR Servant using different fax versions of the same press-release excerpt (see figure).

With a fax generated by the NeXT computer, OCR Servant made only one minor error in converting the image to text. With an optically generated fax in fine setting, there were only two errors.

But using an optically generated fax in standard mode, which HSD explicitly does not support, the text file came out like this (errors in bold):



SAN FRANCISCO, April, 1991 – International Data Group, Inc. (IDG) today announced a new publication schedule for NeXTWORLD magazine, the information source for users and buyers of NeXT computer systems. Beginning in July, NeXTWORLD will publish product-focused quarterly issues supplemented by news-oriented monthly newsletters

This fax, generated by a modem in fine mode, served as our test document.

SAN **FRANCISCQ**, April, 1991- **Intcrnational Daca** Group, Inc. (I~G) today announced a new **publicatia~** schedule for **NeXnXIORL13** magazine, the information source for users and buyers of NeXT **computes** systems. **Bginning** in July, NeXTWORLD will publish **praduct**-focused quarterly issues supplemented by news-oriented monthly newsletters . . .

At this level of accuracy, it would be far quicker to employ one's own on-board optical recognition system and simply type the thing in.

One thing I loved about OCR Servant is its excellent use of a Services menu item. Here is a product so in accord with the idea of software "objects" that it exists only as a service, not on its own. This is the shape of things to come (though HSD is working on a stand-alone version).

Despite all my frustration with the current bleeding edge of this technology, I'm going to use OCR Servant as much as the people who fax to me will allow. What I really want is e-mail instead of faxes, but since I can't get my correspondents to switch over, I might at least be able to get them to set that quality switch to fine. ◆

by JOHN PERRY BARLOW

OCR Servant

◆ ◆ ◆

This services-based optical-character-recognition program is a good performer within the tight parameters of current technology. This version works only through the services menu; a stand-alone version will be released later.

$295; free unlimited technical support

HSD Microcomputer, 1350 Pear Ave., Ste. C, Mountain View, CA 94043. 415/964-1400

Floppy to go

If you own a NeXT computer and don't have a floppy drive, you will need one very soon. Commercial software is now often available only on floppy, and the new format is also becoming the medium of choice for exchanges between users.

SuperFloppy 2.8
PLI

The PLI SuperFloppy 2.8 from Peripheral Land Incorporated (PLI) is an external floppy drive that works with any NeXT system, whether you're retrofitting an old Cube, adding extra drives to new systems that have filled their internal bays with other drive systems, or just wanting another floppy drive.

The PLI drive uses the same Sony 2.88MB mechanism that ships in the current NeXTs. It can read and write three kinds of disks: 720KB, 1.4MB, and 2.88MB ED (extended density), with either MS-DOS/OS-2 or NeXT (UNIX) file structures. Digital Instrumentation Technology's FloppyWorks software, designed to supplement its own, competing floppy drive, can be used with the PLI drive to read 1.44MB Macintosh-formatted disks.

The software that supports the floppy drive is built into NeXTstep, so the PLI package includes no software and little extra documentation. Setup time is minimal, though you will need a SCSI cable, which is not included. The SuperFloppy has two SCSI ports, an external switch for internal temination, and a rotating SCSI address selector for convenient daisy chaining. The power supply is external, adding extra bulk to the system.

When the SuperFloppy began shipping in February, some early units had technical problems. By all reports, PLI has worked through them and worked with early buyers to replace faulty units. In our tests, shipping units were working reliably.

PLI pays tribute to NeXT with its black casing and its support of the new 2.88MB floppy technology. Athough the advantages of 2.88MB technology are currently outweighed by the outlandish $9 per-disk price, no one has ever gone wrong betting on the need for more storage. ◆

by RICK REYNOLDS

PLI SuperFloppy 2.8

◆ ◆ ◆

An external floppy drive for any NeXT, based on the same technology used in NeXT's own internal floppy drives. Early problems with shipping drives seem to be solved, and the new units are working simply and reliably.

$499

Peripheral Land, 47421 Bayside Pkwy., Fremont, CA 94538. 415/657-2211, 800/288-8754, 415/683-9713 fax

X on the NeXT

In 1983, MIT started Project Athena, a campus-wide endeavor to integrate computers into undergraduate education. One of Athena's major breakthroughs was X, a software environment that permits text and graphics to be displayed on any type of computer connected to the network.

MIT made the program freely available to universities and computer companies alike. Over the years it has evolved into a standard UNIX windowing environment with a wide range of applications that support its drawing protocol. The program is now in the fourth revision of its eleventh major version (X11R4).

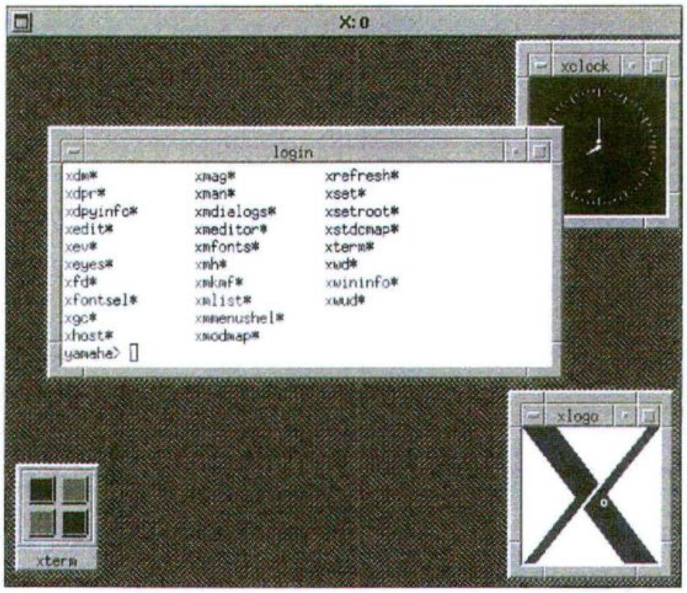
For NeXT users who want to run X applications, MIT distributes an X11R3 server (the third revision) called XNeXT, which can be obtained by anonymous file transfer protocol (FTP) from the computer athena-dist.mit.edu. Now Pencom Software has brought a commercially supported X11R4 to the NeXT computer under the name co-Xist.

Co-Xist consists of a runtime system (including an X server, X clients, and window managers, as well as manual pages and demonstration programs) and a set of development tools (including the toolkits and libraries necessary to build X-based applications on the NeXT machine).

Pencom also sells Motif 1.1–the Open Software Foundation's graphical user interface, toolkits, and window manager–and versions of the MIT X11R4 and the Motif user/programmer documentation as separate products. Motif gives X applications a "look and feel" similar to Microsoft Windows.

To build co-Xist, Pencom created a customized X server running in a NeXT window. This window is basically an independent X terminal, complete with its own window manager. Since X has its own drawing protocol, Pencom made the X server render X drawings into PostScript. Unlike other implementations of X on the NeXT, which completely take over the MegaPixel Display by their ability to switch between environments, Pencom's approach allows both NeXTstep and X to display and work at the same time.

By and large, co-Xist works as expected and performs well. Its 2-bit grayscale window manager looks great in comparison to monochrome X servers. The speed of co-Xist is well optimized, mouse and keyboard interaction is very responsive, and animation programs work well when there is enough memory to prevent disk swapping.



```
xdm*            xmag*           xrefresh*
xdpr*           xman*           xset*
xdpyinfo*       xmdialogs*      xsetroot*
xedit*          xmeditor*       xstdcmap*
xev*            xmfonts*        xterm*
xeyes*          xmh*            xwd*
xfd*            xmkmf*          xwininfo*
xfontsel*       xmlist*         xwud*
xgc*            xmmenushel*
xhost*          xmodmap*
yamahe> ▯
```

The co-Xist window is the X11 environment in the NeXT workspace. The X11 system includes an extensive set of sample X programs. The Motif window manager provides the "look and feel" features to move, resize, zoom, and kill programs.

Unlike typical X servers, which require the expertise of a system administrator for installation and configuration, anyone can install co-Xist in about 30 minutes with only a little luck. The documentation is good at explaining how to use the installer software, but the later steps in configuring X files in user home directories raises some confusion. Without proper X reference documentation (Pencom recommends the *User's Guide for X11R3 and R4* by O'Reilly & Associates), you may need an X guru to help you. The entire installation takes up 45MB of disk space. Pencom's technical support was very responsive and helpful.

There are a few minor irritants. It takes 15 seconds for programs to appear when co-Xist starts to run. The 2-bit X server is unusual in the X community (most others are either 1-bit monochrome, 4-bit color, or 8-bit color), so some X programs will break. None of the source code was made available for sample X programs.

A problem with both XNeXT and co-Xist is that all X applications must compete for the same window, in which they use a window manager that is very different from NeXTstep. No special NeXT features, such as user-programmable keyboard equivalents, work within this X window. If you hide this window, all of the X applications hide. A better, but more complex approach, would be to have each X application create its own NeXTstep window using NeXTstep's window manager.

In a future version, Pencom plans to support NeXT pasteboard/X clipboard text sharing as well as a 12-bit color version for the NeXTstation Color. It also plans to unbundle the development tools, since many users would want just the runtime environment.

Overall, co-Xist is the best solution today to interconnect NeXT with X. It is well produced and provides a much-needed bridge between these two environments. ◆

by JOE BARELLO

co-Xist

◆ ◆ ◆ ◆

An excellent port of the X11R4 window system and Motif 1.1 to the NeXT computer. This is the best solution today to bridge the gap between NeXT computers and X environments. Documentation is limited.

$249 for co-Xist; $100 for Motif
$50 for documentation
$379 for all three

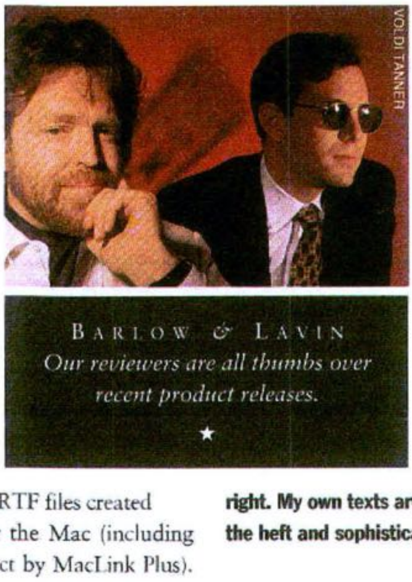
Pencom Software, 9050 Capital of Texas Hwy. N. # 300, Austin, TX 78759. 800/736-2664

WordPerfect 1.0.1

Barlow: I was wary of WordPerfect for the NeXT from the moment I heard it existed. WordPerfect for the PC is easily the most counterintuitive software since Dbase III, and owes its success entirely to the placid presence of 700 Latter-day Saints manning support lines in Orem, Utah. These sweet souls will hold your hand all day while you make your labyrinthine way through 48 completely anti-mnemonic function-key combinations. Without its angels, WordPerfect would have died an appropriate death years ago.

Given my suspicions, WordPerfect for the NeXT is, in some ways, a pleasant surprise. It makes full use of both the graphical interface and the NeXTstep environment. And it is an extremely powerful piece of software. With a few glaring exceptions, if something can be done by any word processor, WordPerfect can do it, and far more fluidly than its text-based siblings.

Further, except for drawing tools, it supports most of the major functions of a big-ticket page-layout program, including kerning, auto-hyphenation, up to 26 (!) columns in newspaper or parallel format, sidebars, and incredibly slick (and speedy) graphics placement and wrap-around. Anyone who says there's no real word processor for the NeXT is uninformed.



BARLOW & LAVIN
Our reviewers are all thumbs over recent product releases.
★

And yet, there's a lot about WordPerfect for the NeXT that meets my worst expectations. It was, after all, made by a company which has proven itself tone-deaf to design. Perhaps trying to kick their hideous fascination with function keys, the folks from Orem have devised a menu structure that's a recipe for carpal tunnel syndrome. It's like mousing one's way through the Amazon watershed.

WordPerfect is also missing some absolutely critical features, like (can you believe it?) an Undo command. One can undelete but not undo. Not only that, it takes the isolationist position that the only files one might need to read were generated by WordPerfect on some other platform. It will read RTF files created by WriteNow, but not those created by Word for the Mac (including Word files which have been converted to WordPerfect by MacLink Plus). It won't save in any exportable format but ASCII.

And it really seems buggy to me. The styles are quite perverse in the whimsicality of their application. Sometimes they convert the highlighted text, sometimes they convert the whole document–even if they are specifically designed not to. If you've got a lot of fonts, loading the first document of a session will take about three minutes. (And don't even consider using it with an '030. The Law moves more swiftly.)

I've saved the worst for last: They don't have the toll-free number for NeXT that's offered for other platforms, and both of the NeXT support people in Orem (there are only two) were out having children during a recent week. My thumb is perfectly horizontal on this one.

Lavin: **Come on John, you're trashing a great program. Any bugs you saw were probably before the March 18 in-line release, which WordPerfect Corporation gives free for the asking. (Any reader who has an earlier release should put down the magazine, call WordPerfect, and then come back to reading this.) I also understand some of your problems, but often that's not a bug–it's a result of having hidden tags in the text.**

Any negatives are more than outweighed by great features: the columns, the graphics handling, and the company's service attitude and follow-through. Pay money for WordPerfect and you can be assured that whatever you don't like now will be fixed. I didn't like it either five years ago on an 8088 PC, but look at the NeXT version. No Alt-F8! There is a god.

FrameMaker 2.0D

Lavin: Ick. Frame has the feel of the mainframe systems of my grade school days. And not the fun mainframe systems, either. Yes, I know that Frame is a very strong program for what it does (it gets four cubes elsewhere in this issue). I just don't like its inflexible approach to frame-based page layout or its rigid cross-platform homogeneity.

Because FrameMaker is exactly the same across all platforms, I feel like I'm using a terminal hooked up to the least-interesting machine it runs on. Frame-based page layout is best suited to long, technical publications, but surely just a little wrapping of text around graphics couldn't be that hard.

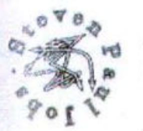
There is lot to be said for taking one thing and doing it well, but Frame is all there is right now on this platform and a few concessions would make all of our lives a little easier. Maybe I'm is so frustrated because Frame Technology is so obviously competent that it really could do more with the NeXT product.

Barlow: **I agree with you on this one, Dan. If I were a nuclear physicist writing a long book about the first two seconds of the universe, I would find FrameMaker exactly the appropriate tool. Its formulaic functionality, its austere precision, and its cosmic scale would be both practical and symbolically right. My own texts are of a generally more whimsical nature. This thing has the heft and sophistication of a warhead. And it's just about as intimidating.**

Create! 1.0

Barlow: In marked contrast to NeXT products from such lumbering industrial golems as Lotus, WordPerfect, and Frame are the fruits of a new tribe of loincloth-and-machete developers who seem to be gathering their yurts around the NeXT. The best and most prolific of these is a dirt hacker from New Mexico named Andrew Stone. This guy (and a few others like Glenn Reid of RightBrain Software, whose TouchType is a marvel of intuition) represents a whole new breed of software designers who understand the incredible capacities of the NeXT as a development engine. His work, which includes TextArt, the soon-to-be-released DataPhile (a serious rival to FileMaker among graphical flat filers), and Create! is clean, extraordinarily self-documenting, and powerful. He is also fast. He and his hackerette colleague Kris Jensen can literally revise and improve large programs overnight. (I made a suggestion for a feature to be included in DataPhile, and the next day, Stone e-mailed me a new version of the program that included it!)

At the moment, Stone Design's flagship is Create!, a combination text enhancer, graphics enhancer, and PostScript drawing program of the Illustrator class. Where Adobe's heavyweight has capacities Create! doesn't include, it can't touch Create!'s abilities to mess with letters. Nor does it do anything with the same ease. Without a manual I was making this sort of thing minutes after loading the program:



I'd show you more, but I'd only demonstrate an embarrassingly dim eye for graphic design. Nevertheless, if I can do this, imagine this tool in the hands of talent.

Create! has only one liability: Many hours will be wasted as knowledge workers dink around with Create! instead of building the spreadsheet empires they are paid to do. But if your job ever requires you to do anything visually creative with text and graphics, there is nothing easier nor mightier on any platform. 👍

Lavin: **You left one developer off your list, John: the wizards of Lighthouse Design. Together with Reid and Stone, these are the triune masters of graphics and a walking set of competitive advantages for the NeXT platform. They prove that PostScript is a powerful language, not just a way to print.**

Another thing you didn't mention is that Create! is excellent for single-page layout as well. It is the ideal tool for super-creative flyers, flip sheets, overheads, or presentations. Create!'s capabilities exceed a normal person's creativity. No bumping into the ceiling on this one. 👍

NeXTmail 2.0

Lavin: I really love NeXTmail; it's where I spend my life now. Even though I've had e-mail of various sorts for ten years, NeXTmail has made the difference between a lifeline to the world and a casual source of contact with friends. Though obviously a lot of this has to do with my nifty connection to Internet mail that dials every half hour, I give a lot of credit to Bryan Yamamoto and his excellent mail program.

The basic interface is easy to use and it just works. Being able to drag files, folders, voice and graphics into and out of your mail messages is a boon that makes standard UNIX mail look sick. Oops, hold on a second, mail just came in. I can tell because the mail icon on my dock changes no matter what application I'm using. I may have a few nits with the interface, but it's Mail's excellence that makes these small shortcomings so apparent. 👍

Barlow: **I live in NeXTmail, too. Unfortunately, I have a number of quibbles with the interface, all of them fixable. For example, you should be able to reply to a message with a simple command key combination. Instead, you have to perform a yogic series of mouse clicks. As with some other NeXT software, one reaches for the mouse far too often. The system for maintaining frequently used addresses is almost completely useless. Finally, I want a better search function that would allow me to search an entire mbox for a text string. As it is, NeXTmail only lets me search either for the names of folks who've sent me mail or through whatever message is in the active window.**

Despite these qualifiers, I am addicted to NeXTmail. I find that when I log into a straight UNIX system with the Terminal and have to use standard UNIX mail, I feel suddenly disabled. Considering the alternative, my thumb is up. 👍

NeXT Support

Barlow: When I first encountered NeXT support, I bounced right off it. With a peremptory wave, they sent me off to BusinessLand (where I was then told that I would have to pay $1000 up front for advice on a machine they obviously knew little about). This put me in mind of Macintosh "support." The apple don't fall far from the tree, I thought.

Then I got desperate. Unlike the Mac, the NeXT is a serious computer and not something you can figure out by yourself unless you're a lot smarter than I am. I found a couple of princes from BaNG (Bay Area NeXT Group), Rick Reynolds and Robert Neilsen, who were extremely helpful, but I soon ran into problems even they couldn't solve. So I took another run at NeXT support, resolved to perform whatever manipulative acts of social engineering were necessary to get me through the door. Both cunning and gall were required. It's easier to get an audience with the Pope.

But when I got through, I encountered something amazing: the most patient and knowledgeable support staff I've ever dealt with. These people are remarkable. I've either talked to or exchanged e-mail with about seven of them at this point, and I found them uniformly smart, good-natured, resourceful, and hard-working. They go at my every problem as though they were killing snakes, and they don't quit until the problems are solved.

If NeXT has any sense of self-preservation at all (and one wonders sometimes), they should unleash this secret weapon and make NeXT support available to everyone who buys a machine. As I said elsewhere, WordPerfect managed to make an almost unuseable program the most popular software in the world on the basis of support alone. Think of what great support could do for a great machine.

Support: 👍 Support policy: 👎

Lavin: **It's true. The tech support people at NeXT are better qualified than the product development people at most companies. One difference is that NeXT views its tech support as a front end for its engineers. If they don't know the answer to a question, then they call the guy who wrote the code.**

But this is just a tease for the average NeXT user. You're a famous songwriter and I'm an editor of *NeXTWORLD.* The average NeXT user has to work with his or her local dealer. In the case of B'Land, this was a joke. In the case of the new dealers, the jury is still out. Currently the only way to get to NeXT's elite support group is to buy a $2500 support package for a year, but you must be a graduate of the $1500 System Administration class to even be eligible to buy it. Both are well worth the price, but I agree that NeXT is missing a real opportunity. Toll-free tech support would really differentiate NeXT.

Support: 👍 Support policy: 👎

The coldly analytical JOHN PERRY BARLOW *writes lyrics for the Grateful Dead and is co-founder of the Electronic Frontier Foundation. The irrational* DAN LAVIN *is a senior editor at* NeXTWORLD. *They both love getting e-mail: jbarlow@nextworld.com and dlavin@nextworld.com.*

NeXTConnection

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NeXTConnection

DOES THIS PICTURE LOOK FAMILIAR?

(WE'VE BEEN DOWN THIS ROAD BEFORE.)

We've got Connections.

Imagine this: in a small New Hampshire town, a few people get together and create an entire mail order company devoted exclusively to a revolutionary personal computer, even though many industry "experts" say it will never take off. We're talking about: ☐ PC Connection ☐ MacConnection ☐ NeXTConnection ☐ All of the above.

The answer is "All of the above." You see, we've been down this road before. Because we know—from experience—that if you offer people a truly new level of computing power, a lot of them will choose it.

Why we like NeXT: the system.

The base-level NeXT Station—040 processor, 8 Meg RAM, 105 Meg hard drive, etc.—is more powerful than most micros will ever be. Huge applications, complex graphics, multitasking, networking—that's what NeXT computers were made for. And they deliver. As fast—and often for less money—than a PC or Mac souped up with all the extra memory and accelerator cards they can handle.

Why we like NeXT: the software.

Suddenly developers are able to create applications that do it all. That do exactly what you always thought you'd be able to do on a computer as fast as you hoped you could do it. Like *Lotus Improv* with its multi-dimensional spreadsheet views and *Adobe Illustrator* with its true Display PostScript screens and WYSIWYG output. Plus installing software is really easy. Multitasking is really straightforward. And networking? We had our first network of four NeXTs operational in under two hours.

Why we like NeXT: the support.

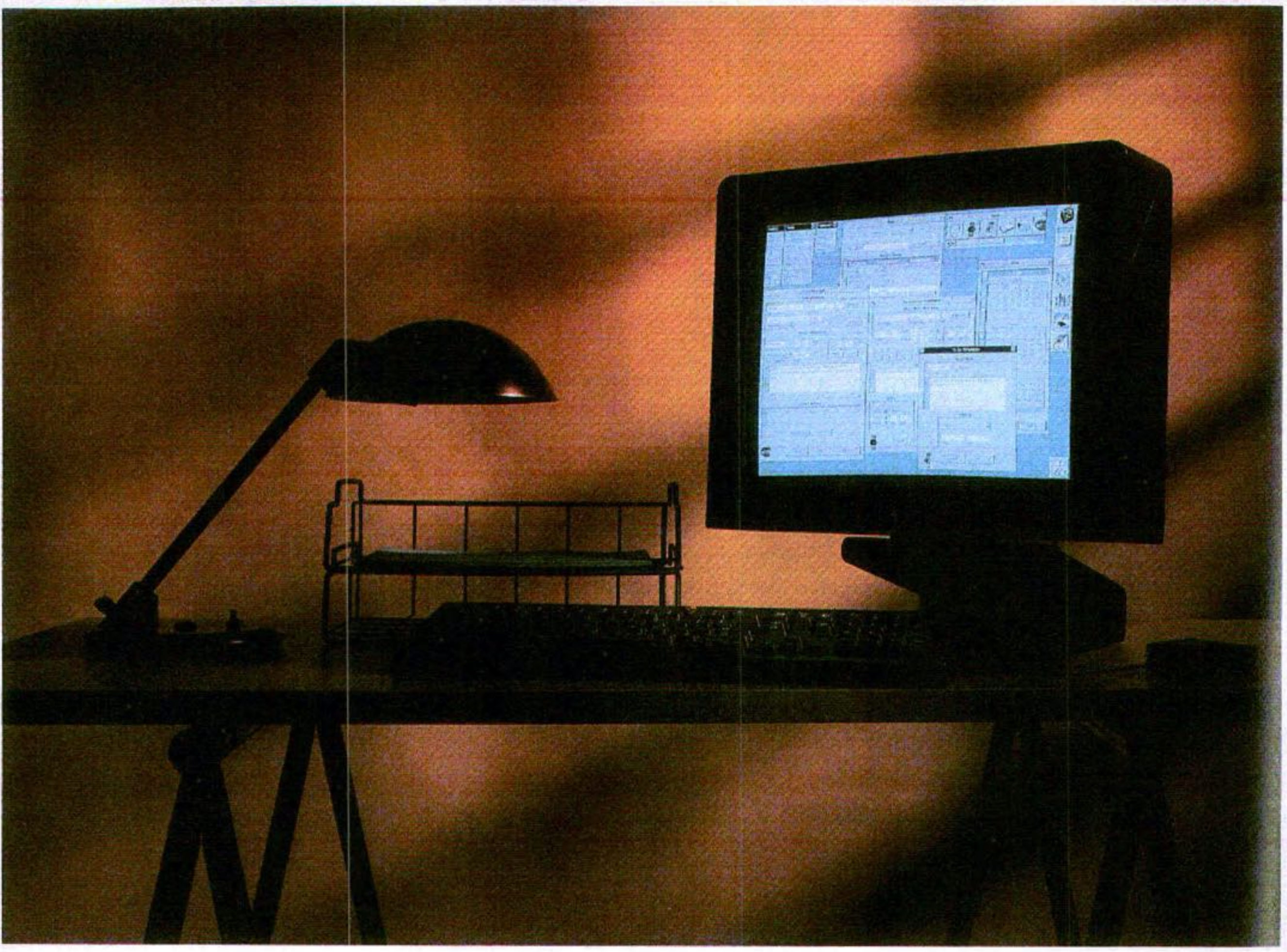
The people at NeXT listen. And respond. In September 1990, they reacted to criticism of the original cube by announcing a new line of machines with 040 processors, internal 2.88MB disk drives, a new operating system, and 2 different color options. All of these systems shipped within 7 months. In fact NeXT is now shipping the machine that the PC (with Windows) and the Mac (with System 7) are trying to be. And many Mac and PC users are starting to make the switch.

So where do we go from here?

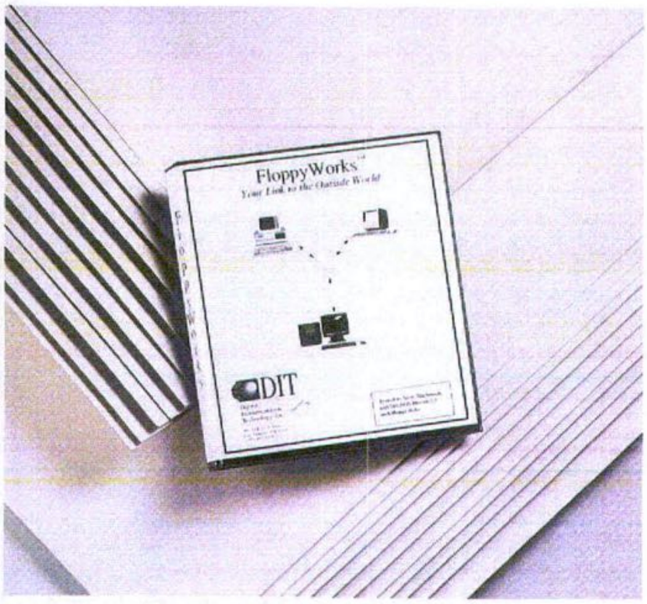
At NeXTConnection we offer a combination of low prices, super-fast shipping (in stock orders phoned in by 3:15 a.m. go out that same night for next day delivery—just $3) and a toll-free number for orders and technical support.

Like you, we're still waiting for a few more good programs. Like one that lets you run Mac applications directly, and a good all around communications package, a basic accounting program and more. But they're all in the pipeline and as soon as they're ready, we'll have them for you. Just like we did for the PC and the Mac. Which is why if you own a NeXT, we'd like to be your Connection. Now. And for years to come.

Chuck Milliken, Jerry Evans, and April McGuire are just a few of the people up here who will gladly talk to anyone anytime about why they think NeXT is the greatest technological innovation since the inclined plane.



DIT DOES WONDERS WITH DATA.



ONDUTY

The personal information manager for NeXT users. OnDuty incorporates all aspects of a personal information manager into one powerful, easy-to-use program. OnDuty gives you unprecedented flexibility in linking important names, telephone numbers, addresses, contact information, appointments, to-do items, and notes. A powerful lookup facility puts all your data at your fingertips, and its server-client database allows multiple users.

OnDuty has all the features you need to get your business day under control: a sophisticated and integrated calendar, a To-Do Manager, a Contact Manager, an Appointment Manager, a Calculator, and a Notepad. And when it's time for an accounting, OnDuty is there with a full range of ready-made reports. A data import and export facility is included.

Digital Instrumentation Technology

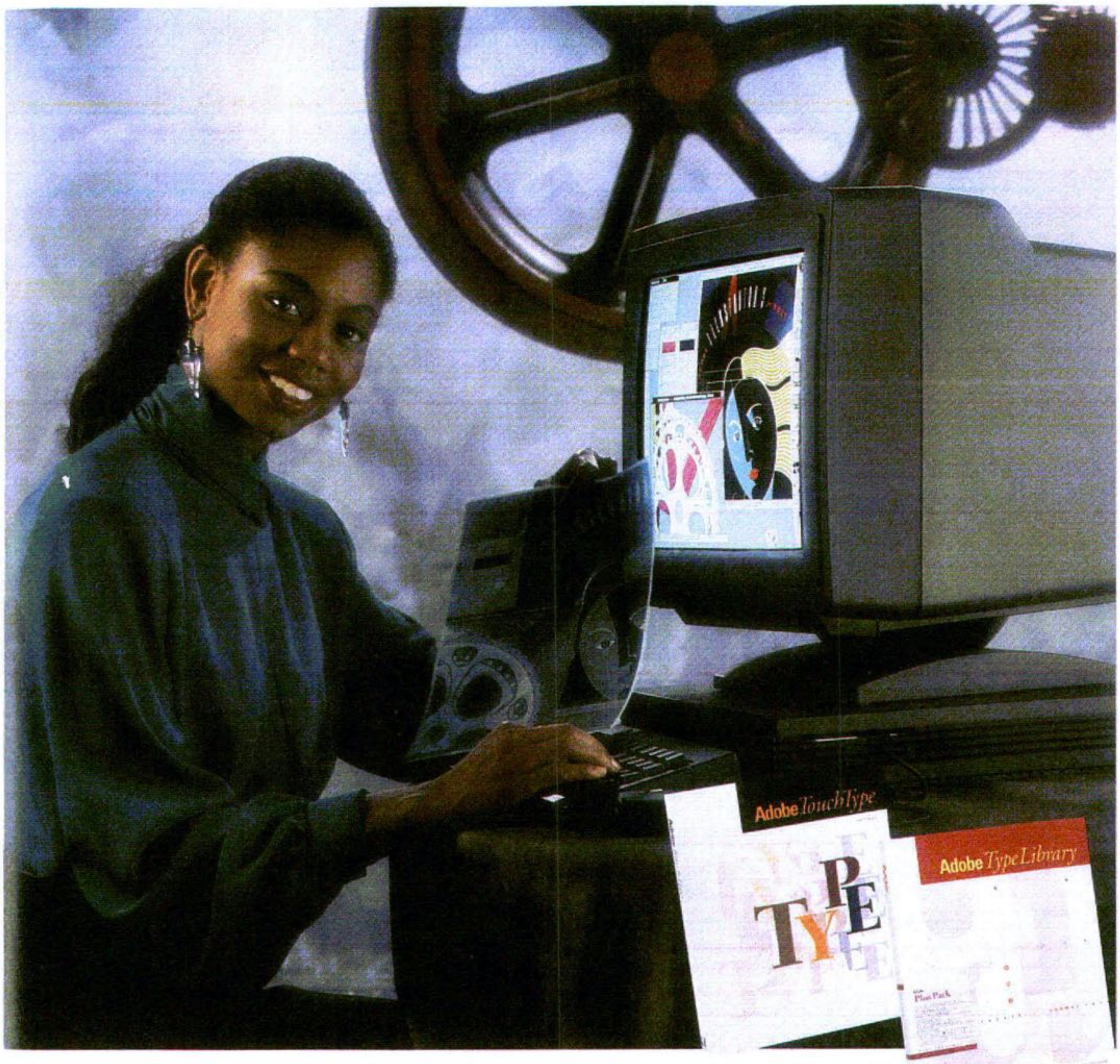
8657 OnDuty 1.0	**$209.**

FLOPPYWORKS

Read, write, and format Mac diskettes? Not only can you do that, but **FloppyWorks** also lets you transfer files easily between Mac, MS-DOS, NeXT, and OS/2 diskettes—720K, 1.44 MB, and 2.88 MB—making it an essential utility for NeXT users who need access to PCs and Macs. File transfers are a breeze—just point and click between two browsers showing files on the hard and floppy disk. And file transfer filters provide a simple means of adjusting data files for different word processing, spreadsheet, database, and graphic formats. Buy FloppyWorks alone or bundled with *CubeFloppy 2.9*, DIT's external floppy drive.

Digital Instrumentation Technology ... 1 year warranty

8656 FloppyWorks	**$185.**
8661 FloppyWorks *(with CubeFloppy 2.9)*	**579.**



GET MORE GRAPHIC THAN EVER BEFORE.

ADOBE ILLUSTRATOR

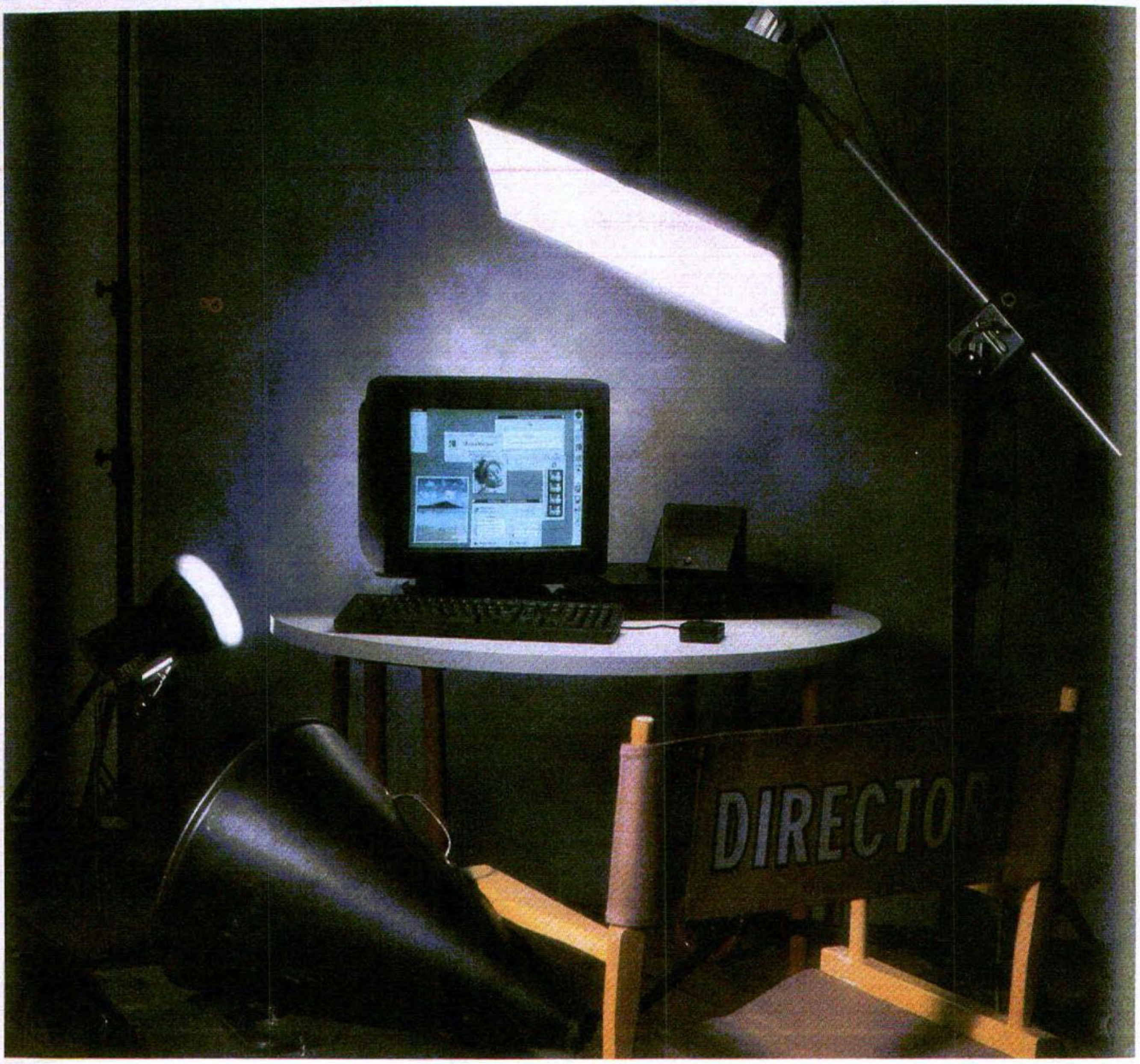
A must for anyone designing a page on a NeXT. With **Adobe Illustrator**, you can start from scratch, create grids for precision drawing, "Auto Trace" existing artwork (including color shades and hues), and/or import EPS and TIFF images. Enhance your visuals with airbrush, contour, highlight, and fill effects using as many colors as you like.

Enter and edit text directly, incorporating various typographic sizes, styles, and colors; and take advantage of sophisticated editing features like text wrap, kerning, vertical shifting, and custom letterforms. Illustrator uses NeXT fonts and color panels, so specifying type and color is easy (PANTONE support, too!). You can edit pages in "preview" or "preview selection" mode—you'll see changes instantly. And NeXT services like Mail or Librarian simplify file transfers and text searches. Overall, it's the ideal tool for business graphics, knock-out ads or flyers, and/or complex technical illustrations.

Also from Adobe, the new **Adobe TouchType** gives you expert typography in an easy-to-use interface. It's the perfect complement to Adobe Illustrator and all other applications that use or need type. Features include powerful kerning, a font selector that allows you to choose a typeface by viewing its design (rather than a list of names), and the ability to position letters anywhere on the page. And to spruce up your type collection, try the **Adobe Plus Pak** (22 popular Type 1 PostScript Fonts) and/or **Adobe Type Set Packages** (#1 and #2 are display; #3 for text faces) for big savings over buying individual fonts.

Adobe

1827 Adobe Illustrator 3.0	**$459.**
9741 Adobe TouchType 1.0	**175.**
9765 Adobe Plus Pack 1.0	**199.**
1832 Adobe TypeSet 1	**65.**
1832 Adobe TypeSet 2	**65.**
1834 Adobe TypeSet 3	**129.**



MULTIMEDIA IS THE MESSAGE.

MEDIASTATION 1.53

Lights, camera, action, sound, and more. Welcome to the wonderful world of **MediaStation**—the integrated multimedia database and authoring system. This multitasking, multiuser application package lets you capture, process, organize, store, and present high-resolution graphics, CD-quality sound, animation, video, and text. MediaStation was developed for folks who archive and retrieve media and who create computer-based training, interactive presentations, electronic storyboards, and dynamic multimedia libraries. Additional uses are possible in medical imaging, facilities management, human resources, and other fields.

In MediaStation's *Format Mode*, you design the look of your graphic interface and multimedia applications. In *Enter Mode* MediaStation accepts scanned images (and TIFF and EPS files), digitized video and stereo sound, and text files. Powerful authoring tools let you edit and annotate images, sound, and text and create cell-by-cell animation. Completed entries are equivalent to database records and can be indexed, searched, and sampled in *Browse Mode*. The *Presentation Mode* with its Script Maker feature allows you to create and play back a desktop presentation, and *Forms Mode* helps you create and save forms used to print reports with images and text.

MediaStation is fully networked. Recommended storage devices include read/write optical disks, CD-ROM, and network file servers. It also supports high-resolution scanners, DSP audio devices, video recorded with *DigitalEye*, and export of multimedia to other applications. It's showtime on the NeXT.

Imagine, Inc.

1396 MediaStation 1.53	**$829.**
1397 MediaStation 1.53 *(5 pack)*	**3129.**
1398 MediaStation 1.53 *(10 pack)*	**9379.**

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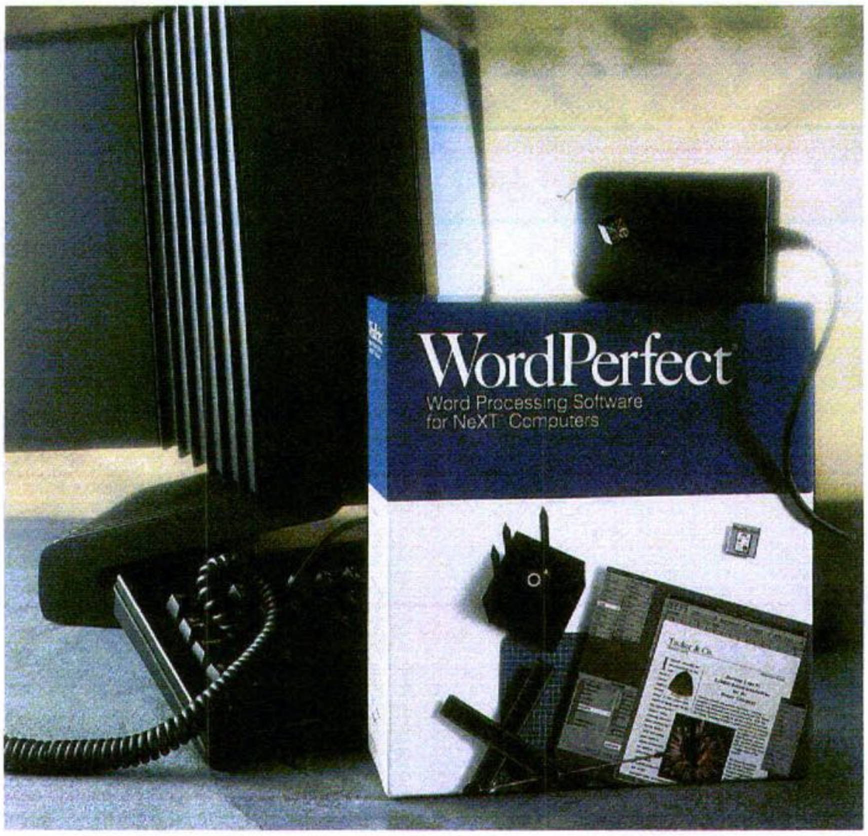
WORDPERFECT

The NeXT step in word perfection. If you want to concentrate on your writing and not your software, **WordPerfect** is just the ticket. Whatever form your writing takes: professional newsletters, brochures, correspondence, reports, or anything you care to create, WordPerfect has the features and ease of use that help keep your thoughts flowing. This full-featured word processor offers: columns (newspaper and parallel), powerful macros, merge (making mass mailings simple), table of contents, indexing, footnotes/endnotes, and much more. Questions? Ask the Digital Librarian or consult the on-line reference manual. When it's all said and done, check your work with the 115,000-word speller, or explore better wording with the comprehensive thesaurus.

WordPerfect easily integrates text and graphics, so you can turn newsletters or direct mailings into head-turners (and page-turners). You can place graphic images complete with captions or borders anywhere on a page (inserted in a line of text, tied to a paragraph, or placed in a header or footer) and scale, move, and rotate them in myriad ways. And to protect your work, the automatic timed backup will save your work at regular intervals. This is full-featured word processing for the NeXT.

WordPerfect

8818 WordPerfect 1.0.1	**$329.**

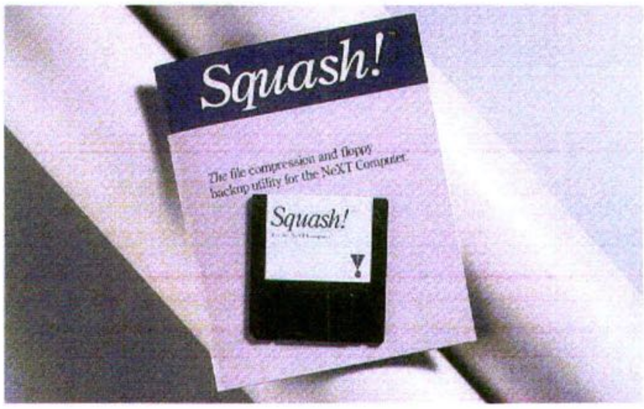


SQUASH!

The smaller the better. With **Squash!**, you can compress folders and files to a fraction of their original size. Copies of folders can be compressed onto multiple floppies, making quick backups of large folders a snap. Files can be compressed in Workspace by pressing a single command key and decompressed and opened with just a double-click. You can even have it find and squash old files at night so you wake up with more disk space in the morning! It's an inexpensive way to increase your available disk storage and backup your important data to floppies.

Agog, Inc.

1476 Squash! 1.0	**$79.**
1478 Squash! 1.0 *(10 pack)*	**699.**

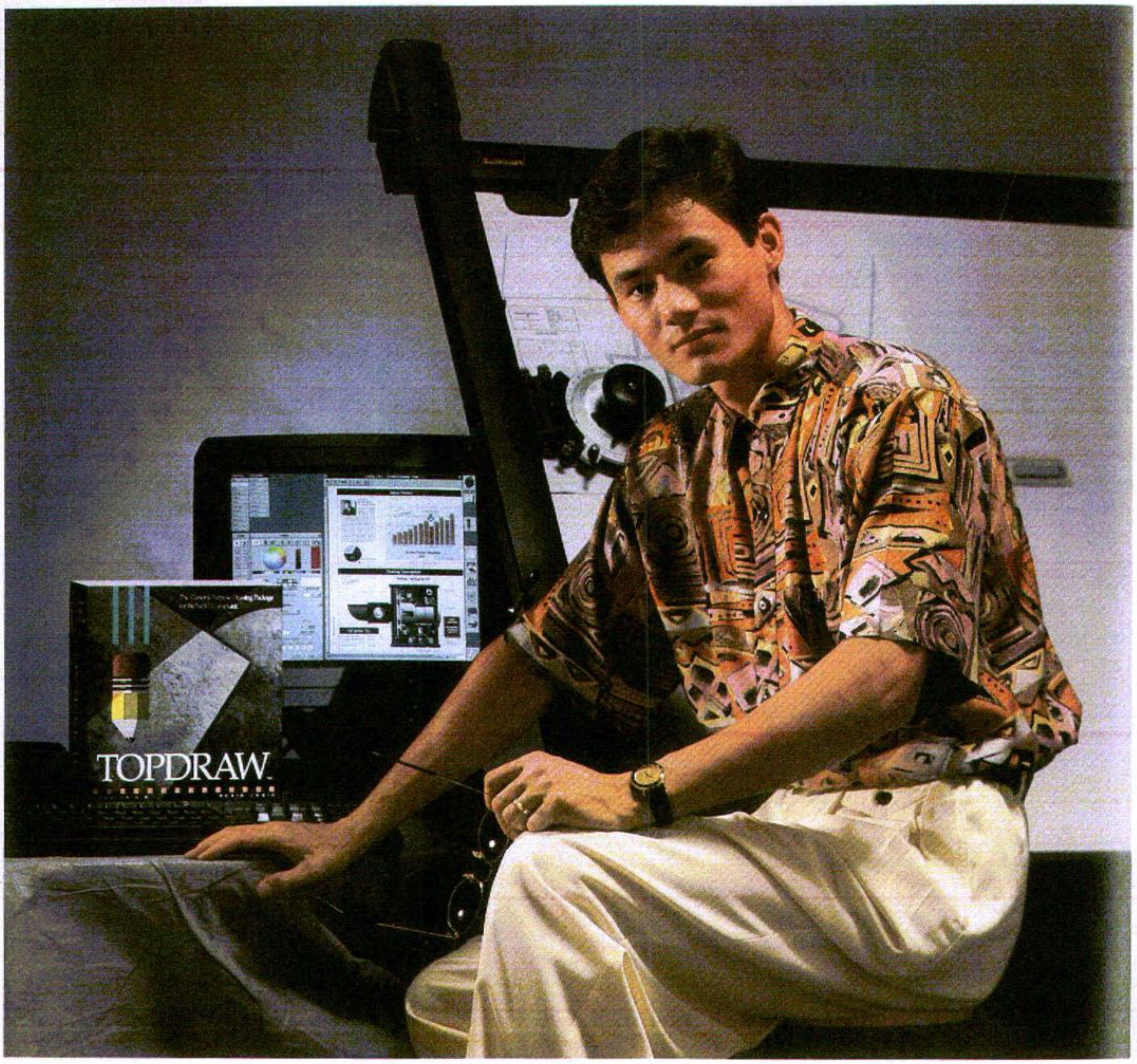

Squash!
The file compression and floppy backup utility for the NeXT Computer
Squash!

MARBLE TELECONNECT

Dial in to your network. With **Marble Teleconnect**, all the resources of a remote network (such as mail, peripherals, and databases) are available to the individual telecommuter or to the satellite office. It enables NeXT computers to run the Internet Protocol (IP)—and the thousands of software packages that depend on that protocol—over telephone lines. Teleconnect provides a significant improvement over conventional PC- and Macintosh-based communications packages, and allows NeXT users to enjoy the benefits of NeXT applications and multitasking. For example, the user can simultaneously transfer files, log on to multiple machines on a remote office network, and work with NeXT applications such as NeXT Mail, Lotus *Improv*, and *WordPerfect*.

Marble Associates, Inc.

1012 Teleconnect	**$249.**



POWER DRAWING FOR EVERYONE.

TopDraw

Graphics for every skill level. Regardless of your artistic talents, you'll appreciate **TopDraw**'s comprehensive graphic tools and PostScript output. Casual users can create high-impact diagrams, charts, and graphs. For advanced designers, TopDraw provides sophisticated layout and illustration capabilities, including tools for importing, editing, and integrating continuous-tone raster images.

Select design objects to draw lines, rectangles, squares, circles, ellipses, arbitrary polygons, and smoothly curved shapes—all automatically. Shapes may be filled with spot color, shades of gray, or pattern then layered, scaled, rotated, "zoomed", and skewed. Graded tones, opacity control, and user-definable dash patterns and line width are also available.

Add text in any size, at any angle, within objects, or along any path. (You can cut and paste text from *WriteNow* and *FrameMaker*.) Change fonts, stroke width, spacing, justification, and margins for individual letters or complete paragraphs. And TopDraw lets you edit text even after graphic manipulation, making sophisticated effects easy to create and change.

TopDraw imports images from a host of scanners as well as PostScript, Encapsulated PostScript (EPS), Tagged Image File Format (TIFF), Maker Interchange Format (MIF), and Rich Text Format (RTF) image files. Scale, crop, skew, rotate, and adjust raster images for brightness and contrast before they're placed in layouts. And when you're ready to show your top-drawer TopDraw graphics, mechanicals and films may be output on a range of devices, from laser printers to sophisticated PostScript color image setters.

Media Logic

9987 TopDraw 1.0C. . . . . $479.

OPTICAL & FLOPPY DISKS

Don't get caught short. One of the laws of computing seems to be that you never have enough blank disks when you need them. Well, whether you rely on 2.88 floppies or optical disks for your daily (and backup) storage requirements, we can keep you well stocked. **512 MB Optical Cartridge** are designed specifically for the 68030 and 68040 cube and have 256 MB available on each side for a total of 512 MB of storage per disk. For NeXT floppies, we have dependable **Toshiba 3½" ED Diskettes**. Just format and then fill them with all the application and data backups you need to run a nice, safe, secure operation.

Canon
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Canon ... 90 day MBG

9811 512 MB Optical Cartridge *(MO-502m)*	**$175.**

Toshiba ... lifetime warranty

9754 Toshiba 3½" ED Diskette *(Qty. 1)*	**8.**
9755 Toshiba 3½" ED Diskettes *(Qty. 10)*	**79.**

16 MEG UPGRADE KIT

The more the merrier. Once you start multitasking a host of high-end applications, 8 Meg of RAM can start filling up real fast. That's when it's time to get a NeXTConnection **16 Meg Memory Upgrade Kit.** It consists of four 4 MB, low-profile, non-parity, 80 ns SIMM modules that are compatible with the 68030 and 68040 cube and the 040 workstation (monochrome only). You can install them yourself in the cube (and we provide toll-free tech support), but you risk voiding the warranty if you do so in the workstation so we recommend having an authorized dealer do it for you. Either way, it's the inexpensive fast track to more NeXT power.

Memory ... 2 year warranty

8911 16 Meg Memory Upgrade Kit	**$895.**

DOVEFAX

Is it a fax? Is it a modem? Yes! Yes! Whether you've got a computer-generated file to fax or data to send, **DoveFax Desktop for NeXT** has the solution. In short, it's an external serial device featuring a 9600 baud fax modem and a 2400 baud Hayes-compatible data modem. The fax features true background operation, an on-line telephone directory, on-screen display of faxes, automatic answering, customized cover pages (with graphics and text), fax preview, and Display PostScript imaging. The modem can be used with a variety of communications services, telecommunications applications, and electronic bulletin boards. It's easy to install and use and, like all Dove products, is backed by a one-year warranty.

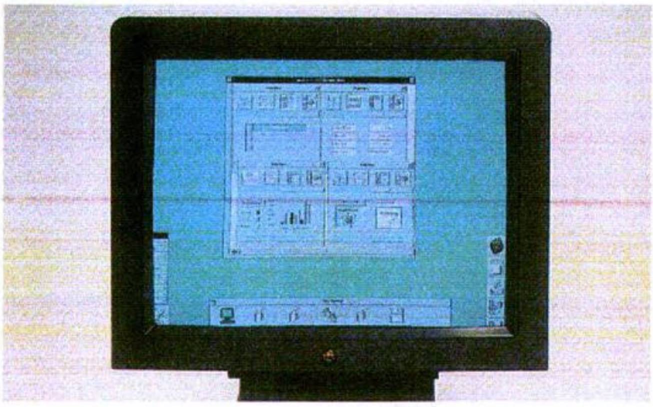
DOVE
DoveFax Desktop
DoveFax

Dove Computer ... 1 year warranty

9356 DoveFax Desktop for NeXT *(includes 2400 modem)*	**$395.**

OT PALETTES

Increase your development power. And save money, too, by dramatically reducing programming time. Use **OT Palettes** 2.0, the first objects created by the only commercial custom palette developer for NeXT's Interface Builder. **SmartField** is an advanced text field formatting and character validation object. **Math** provides front-end development tools for *Mathematica*. **Graph** allows fully interactive graphs to be incorporated into custom applications. **Chooser** is a scrolling selection list. Call NeXTConnection for more information.



Objective Technologies

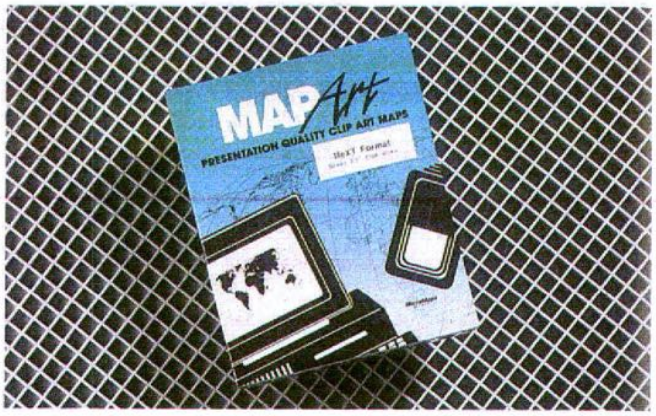
9345 [OT Palette: 2.0] SmartField	**$650.**
9346 [OT Palette: 2.0] Math	**650.**
9344 [OT Palette: 2.0] Graph	**1259.**
9347 [OT Palette: 2.0] Chooser	**429.**

PERIPHERAL LAND DRIVES

Sophisticated storage solutions. PLI's **SuperFloppy 2.88** gives you the convenient high capacity of the latest drive standard along with complete read/write/format compatibility with 720K and 1.44 Meg disks. And it has a SCSI interface for easy connection to any NeXT. The **Infinity Turbo 40** won an Eddy award from *MacUser* because it combines the unlimited storage capacity of removable cartridges, the reliability of the SyQuest mechanism, and a 20 ms access time that rivals high-end hard drives. There's also a two-slot **Infinity Twin** model available. So whether you need a 100%-compatible 2.88 floppy or a super-fast 45 Meg removable-cartridge drive (or both), head for Peripheral Land.

Peripheral Land, Inc. ... 1 year warranty

8547 SuperFloppy 2.88	**$449.**
8893 Infinity Turbo 40 MB Cartridge Drive	**829.**
8894 Infinity Twin 40 MB Cartridge Drive	**1375.**



MAPART

Maps for desktop publishing and graphic design. Imagine over 5 MB of high-quality map graphics at your fingertips! With **MapArt**, you get a comprehensive map collection that makes it easy to create attractive map graphics for brochures, newsletters, and presentations. Customize maps with *Adobe Illustrator* or import as background images in most NeXT applications. Maps feature country/state borders, latitude/longitude lines, and country/city names. Since each feature is a separate object, you can select areas, modify text, and add drop shadows and graphics to create your own design. MapArt includes four world maps, 12 regional maps of all world continents, plus detailed maps for 24 major countries that show state/province boundaries.

Micro Maps

9276 MapArt 1.0	**$95.**

OBJECTIVE DB TOOLKIT

Get friendly with SYBASE. A boon for developers, **Objective DB Toolkit** fills the gap between the SYBASE database engine and applications. This versatile object library provides higher-level access to the Structured Query Language and Links the SQL Server with Interface Builder. It offers extensive templating for TextFields and mapping of palette objects to data types, letting you add functionality to data types. The Toolkit accommodates text, image, and sound data and supports pop-up lists as well as text, buttons, and slider arrays.

Field definition requires no programming and field characteristics may be modified dynamically. Each window and field may be set up to trigger specific database access or processing commands. The Toolkit also provides automatic data transfer to screen fields and generates data portions of SQL insert and update statements.

For easy manipulation of sound messages, you can associate a sound interface with database variables. And a browsing facility—loaded directly from an SQL statement—can print browser contents with no programming required. And fully multilingual applications are easily generated.

Professional Software

9357 Objective DB Toolkit 2.0	**$895.**

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Insignia
QUATTRO PRO
WordPerfect
PASCAL

OPEN THE DOOR TO DOS.

SoftPC

It's a PC-on-a-disk! Now you can run any MS-DOS application on your NeXT system with **SoftPC**, the software-based PC emulator. If you depend on a specialized PC program or PC datafile—or have PC-based co-workers—SoftPC can make platform hopping simple and fast. It'll also help you protect your investment in DOS software and training. As *NeXTWORLD* said, "This undertaking is so important and so difficult, and SoftPC succeeds so well at it, that SoftPC ranks as one of the most important programs for the NeXT."

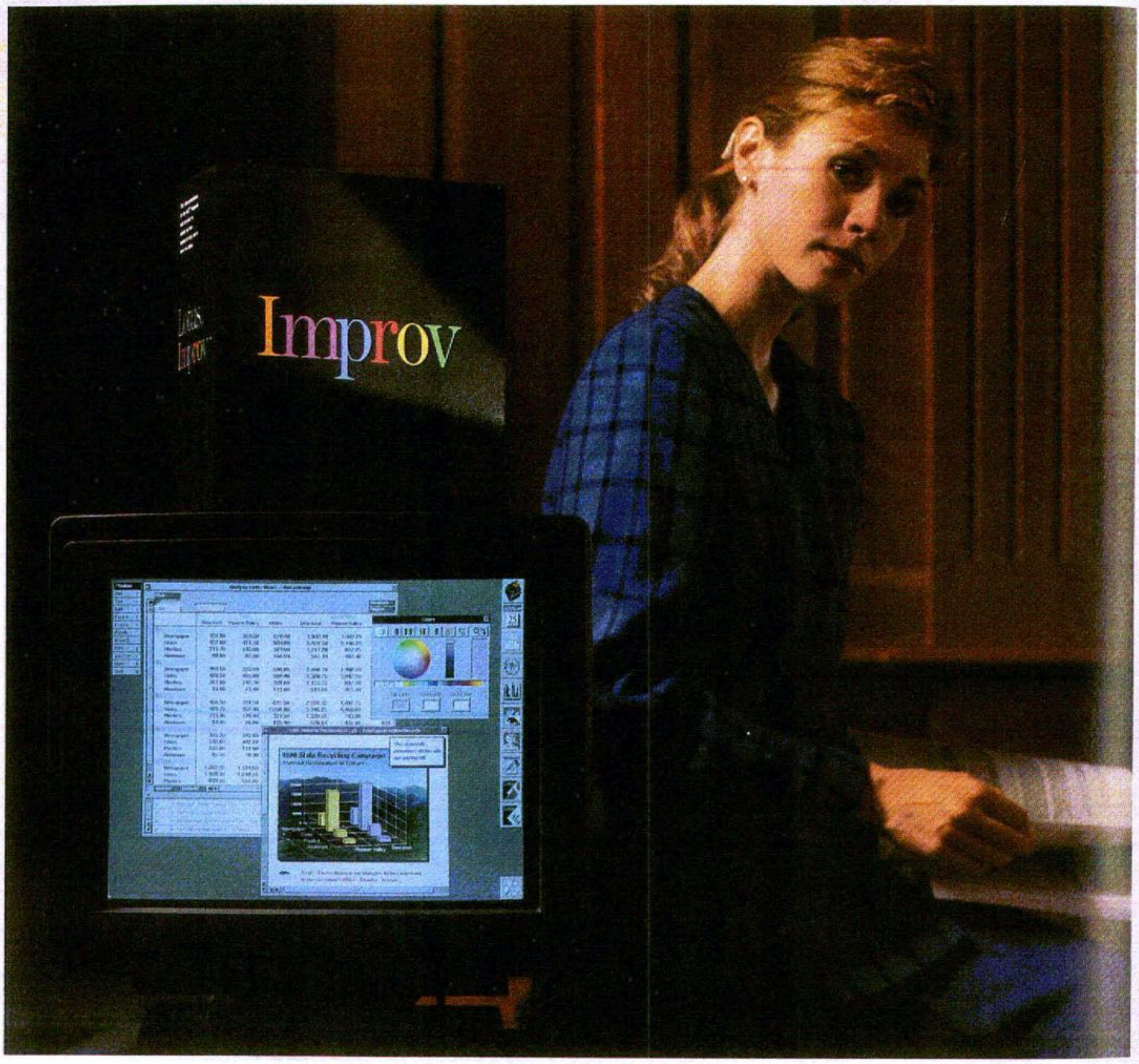
SoftPC duplicates an IBM PC/AT with 80286 and 80287 processors, offering C: and D: drives, MS-DOS 3.3 (you can install 4.0), and support for EGA and CGA video in monochrome and color. There are two printer ports and two communication ports that can be directed to NeXT serial ports or to any UNIX device, process, or file. SoftPC will even transform your NeXT mouse into a Microsoft mouse on the screen.

SoftPC's special features give DOS applications a boost in performance and versatility. NeXT and DOS software can run side by side and share files as easily as copying them. NeXT modems, printers, floppy drives, CD-ROM, scanners, and other peripherals are available to your PC program. And for mega-applications, SoftPC opens up an astounding 32MB of RAM to your DOS programs.

While SoftPC will work on any system running NeXTstep 2.0, a 68040 processor is recommended. Get the power of the NeXT with the rich application library of DOS—isn't that what you've been waiting for? Well, you can have it all with SoftPC.

Insignia Solutions

1456 SoftPC 2.0	**$329.**



K

LOTUS REINVENTS THE SPREADSHEET.

LOTUS IMPROV

Look at your data in a whole new light. What happens when you give the creators of the world's best-selling spreadsheet an 040 processor, 8 Meg of RAM and let them improvise to their heart's content? You get **Lotus Improv**, a revolutionary spreadsheet for analyzing, viewing, and presenting your data in ways never before possible.

The unique dynamic views feature of Improv lets you see the same data in multiple ways to explore data relationships and prepare targeted reports. Just use the mouse to rearrange your spreadsheet and get a whole new view instantly, without any re-keying. You can actually work with 12 different dimensions of data at once, displayed in 2D or 3D format.

Improv lets you use plain English to define cells and create formulas (e.g., "Dollars = Tons x 12.5"). So your spreadsheets document themselves and are easy to modify or re-use. And for complex formulas, you can call on a host of built-in *Lotus 1-2-3*-style functions. All of which makes it easy to build spreadsheets from scratch. And you can also use the extensive collection of prepackaged templates and/or import existing *1-2-3* files directly.

Ready to show off your stuff? Improv lets you combine graphs, texts, images, and even sound with stunning clarity and resolution that takes full advantage of NeXT.

How good is it, really? *Byte* (10/90) wrote, "Improv knocked me out." *PC World* (11/90) called it "a stunningly simple approach to organizing complex data." And *What Micro? Magazine* (UK, 4/91) awarded it "Most Innovative Product 1990."

Lotus Development
9794 Improv 1.0 . . . . $549.

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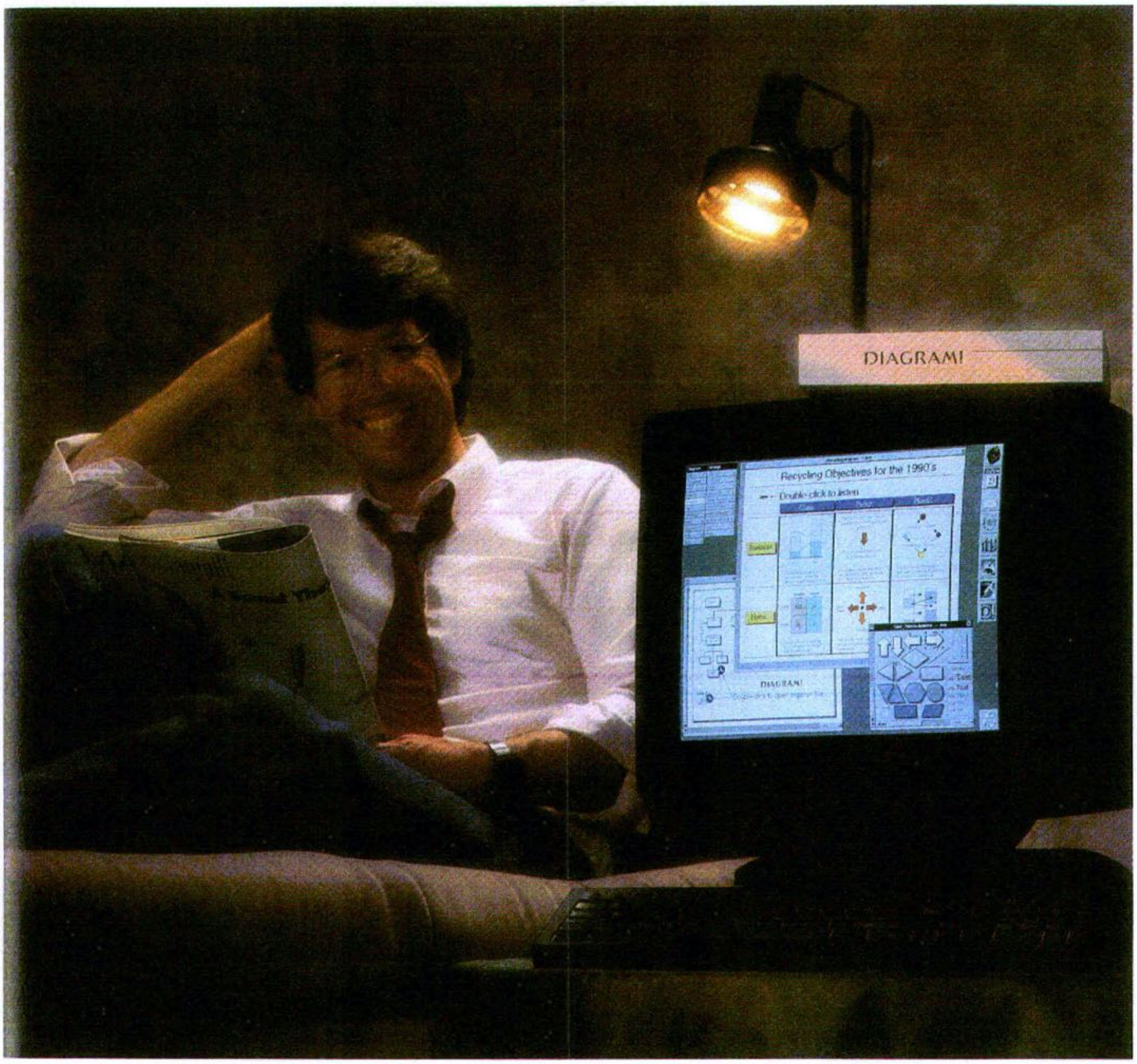
DIAGRAM!
Recycling Objectives for the 1990's
DIAGRAM!

GRAPHICS FOR PEOPLE WHO USE THEM EVERY DAY.

DIAGRAM!

Diagram! packs graphics power and production. Do you use graphics in your business? To get your message across fast and with high impact? **Diagram!** is a new kind of presentation graphics package that lets you combine drawings, data, sound, and even files from other applications quickly and effectively. Just double-clicking in your Diagram! drawing will open *Improv* spreadsheets, reveal *WordPerfect* or *FrameMaker* documents, or play back voice recordings. Setting links is as easy as dragging in a file and dropping it!

Diagram! is a full-featured graphics application with all the extras to make drawing, revising, and presenting information a snap. With customizable symbol palettes, you're freed from switching back and forth between conventional tools. Instead, you point to shapes and drag them into your document. If you don't see what you need, modify your palette and you've instantly customized Diagram!. Overall, it's one of the biggest innovations in drawing technology since the Macintosh.

In addition, once you've drawn a line between objects, Diagram! takes over: "rubberbanding" lines to automatically maintain organizational charts, process flows, or decision trees—any structured drawing. That's right, this is a graphics program designed for people who *use* them every day.

By the way, you don't have to be in business to enjoy the power of Diagram!— students and universities have proven to be big fans also. Ask about the special educational discounts available.

Lighthouse Design, Ltd.

8621 Diagram! 1.0	**$339.**

Corporate Accounts Welcome

Yes, we gladly accept P.O.s. Always have, always will. In fact, we do everything possible to make corporate mail-order purchasing of computer software and peripherals as easy and enjoyable a process as possible—within the realm of common decency, of course. Many companies (including most of the Fortune 1000 and other just-as-fortunate smaller ones) have accounts with us. If you'd like to open one (or check whether your company already has one), simply call our order line at 800/800-NeXT.

PRODUCT INDEX

PUBLISHING & GRAPHICS

Item#	***Manufacturer***	***Price***
	Adobe	
	(See page D)	
1827	Adobe Illustrator 3.0	$459.
9765	Plus Pack 1.0	199.
9741	TouchType 1.0	175.
1832	Adobe TypeSet 1	65.
1833	Adobe TypeSet 2	65.
1834	Adobe TypeSet 3	129.
	Lighthouse Design, Ltd.	
	(See page L)	
8621	Diagram! 1.0	339.
8660	Diagram! 1.0 *(optical media)*	469.
	Media Logic	
	(See page G)	
9987	TopDraw 1.0C	479.
	Micro Maps	
	(See page I)	
9276	MapArt 1.0	95.
	Stone Design	
8658	TextArt 1.0	319.
8666	TextArt 1.0 *(optical media)*	549.
	T/Maker	
1185	ClickArt 1.0	195.

RECREATIONAL

	Athena Design	
9457	Culture Shock 1.0	22.

GENERAL BUSINESS & PRODUCTIVITY

	DIT ... 1 year warranty	
	(See page C)	
8657	On Duty 1.0	209.
	Imagine, Inc.	
	(See page E)	
1396	MediaStation 1.53	829.
1397	MediaStation 1.53 *(5 pack)*	3129.
1398	MediaStation 1.53 *(20 pack)*	9379.
1400	MediaStation Educ. Package	295.
1394	MediaStation Educ./Ntwk. Pkg.	2795.
	Insignia Solutions	
	(See page J)	
1456	SoftPC 2.0	329.
	Lotus Development	
	(See page K)	
9794	Improv 1.0	$549.
	WordPerfect	
	(See page F)	
8818	WordPerfect 1.0.1	329.
8859	WordPerfect *(5 user)*	1289.
8928	WordPerfect *(20 user)*	3799.

PROGRAMMING TOOLS

	Absoft	
8898	Fortran 77 3.0	839.
	Objective Technologies	
	(See page H)	
9347	[OT Palettes: 2.0] Chooser	429.
9344	[OT Palettes: 2.0] Graph	1259.
9346	[OT Palettes: 2.0] Math	650.
9345	[OT Palettes: 2.0] SmartField	650.
	Professional Software	
	(See page I)	
9357	Objective DB Toolkit 2.0	895.

AUDIO & VISUAL PRODUCTS

	Metaresearch ... 1 year warranty	
9682	Digital Ears	519.
9683	Digital Ears *(with Soundworks)*	695.
9681	Digital Eye	849.
9680	Soundworks	269.

COMMUNICATIONS & DATA TRANSFER

	Marble Associates, Inc.	
	(See page F)	
1012	Teleconnect	249.
	Abaton ... 1 year warranty	
8665	InterFax 24/96 *(fax/modem)*	489.
8620	300/GS Scanner *(requires Interface Kit)*	999.
9449	Interface Kit *(for 300/GS)*	479.
	Dove Computer ... 1 year warranty	
	(See page H)	
9356	DoveFax Desktop for NeXT (includes 2400 modem)	395.
	Hayes ... 2 year warranty	
2307	Smartmodem 2400 *(requires cable)*	349.
6655	V-Series 2400 Modem *(requires cable)*	449.
5991	V-Series 9600 Modem *(requires cable)*	$539.
7391	Ultra 9600 Modem *(requires cable)*	669.
	Intel ... 5 year warranty	
5119	2400EX Modem *(requires cable)*	179.
7880	9600EX Modem *(requires cable)*	549.
6420	2400EX MNP Modem *(requires cable)*	229.
	Telebit ... 1 year warranty	
8907	T2500 Modem *(requires cable)*	979.

CONNECTIVITY

	Data Viz	
1823	MacLinkPlus/PC 5.0	129.
	DIT ... 1 year warranty	
	(See page C)	
8656	FloppyWorks	185.

UTILITIES

	Agog, Inc.	
	(See page F)	
1476	Squash! 1.0	79.
1478	Squash! 1.0 *(10 pack)*	699.
1479	Squash! Educational Pack 1.0	49.
1481	Squash! Educational Pack 1.0 *(10 pack)*	429.
	DIT ... 1 year warranty	
	(See page C)	
8661	FloppyWorks *(with CubeFloppy 2.9)*	579.

DRIVES & CABLES

	Cables ... lifetime	
8906	SCSI 2-50 Pin Centronics *(4 ft.)*	45.
8992	68030 Modem Cable *(8 ft.)*	15.
8991	68040 Modem Cable *(8 ft.)*	15.
8908	SCSI 1-50 Pin Centronics	12.
8909	50 Pin-50 Pin Centronics	15.
1106	SCSI Terminator	29.
	Micropolis ... 2 year warranty	
8984	280 MB Ext. Hard Drive *(15 ms)*	1629.
8979	280 MB Int. Hard Drive *(15 ms)*	1429.
8978	550 MB Int. Hard Drive *(16 ms)*	2099.
8919	860 MB Int. Hard Drive *(15 ms)*	2949.
	Peripheral Land, Inc. ... 1 yr. wrnty.	
	(See page I)	
8887	Caddy for CD-ROM Drives	19.

M

8899	CD-ROM Drive	$875.
8890	1.2 GB Ext. Hard Drive *(15 ms)*	4875.
8891	320 MB Ext. Hard Drive *(11 ms)*	2495.
8892	635 MB Ext. Hard Drive *(12 ms)*	4495.
8888	300 MB Ext. Hard Drive *(17 ms)*	2129.
8889	600 MB Ext. Hard Drive *(17 ms)*	2829.
8897	Optical Drive Media	199.
8896	Infinity Optical Drive *(Sony)*	3875.
8893	Infinity 40 MB Cartridge Drive	829.
8894	Infinity Twin 40 MB Cartridge Drive	1375.
8905	SCSI 2 to Centronix Cable *(50 pin)*	49.
8547	SuperFloppy 2.88	449.

SCANNERS

	Abaton ... 1 year warranty	
8665	InterFax 24/96 *(fax/modem)*	489.
8620	300/GS Scanner *(requires Interface Kit)*	999.
9449	Interface Kit *(for 300/GS)*	479.

ACCESSORIES

	American Power ... 2 year warranty	
7105	Smart-UPS 600	469.
9365	Smart-UPS 900	669.
9364	Smart-UPS 1250	879.
9366	Smart-UPS 2000	1339.
7107	Back-UPS 450	279.
7106	Back-UPS 520	329.
7105	Back-UPS 600	469.
7110	Back-UPS 800	599.
7109	Back-UPS 1200	799.
	Avery	
4808	1⅓" x 4" Laser Labels *(Qty. 1400)*	24.
4812	½" x 1¾" Laser Labels *(Qty. 2000)*	7.
4807	1" x 2⅝" Laser Labels *(Qty. 3000)*	24.
4809	2" x 4" Laser Labels *(Qty. 1000)*	$24.
7050	1" x 2 5/16" Clear Laser*(Qty. 1500)*	32.
4813	3⅓" Round Labels *(Qty. 150)*	7.
5392	3½" Disk Labels *(Qty. 630)*	29.
5393	5¼" Disk Labels *(Qty. 840)*	29.
4810	8½" x 11" Laser Labels *(Qty. 100)*	24.
4811	8½" x 11" Laser Transparencies *(Qty. 50)*	22.
	Canon ... 90 day warranty ***(See page H)***	
9811	512 MB Optical Cart. *(MO-502m)*	175.
	Curtis Manufacturing ... lifetime	
1707	Ruby *(SPF-2)*	55.
1708	Ruby Plus *(SPF-2+)*	65.
5832	Ruby Remote *(SPFR-2)*	65.
5985	Safe Fax *(SF-1) (1 year warranty)*	19.
9757	Top Shelf *(TS-1)*	18.
1713	Filtered Safe Strip *(SPF-3)* *(1 year warranty)*	24.
1718	3½" Disk File *(DB-2) (holds 40)*	8.
	Hewlett-Packard ... 120 day wrnty.	
8099	Toner Cartridge for NeXT Printer	95.
	Kensington ... 1 year warranty	
4971	Modem/Fax Protector 20	25.
4972	Power Tree 10	19.
4973	Power Tree 20	27.
4974	Power Tree 50	54.
5577	PowerBacker 450 *(2 yr. warranty)*	299.
5578	PowerBacker 520 *(2 yr. warranty)*	349.
5230	PowerBacker 800 *(2 yr. warranty)*	649.
5228	PowerBacker 1200 *(2 yr. warranty)*	829.
	Maxell ... 60 day MBG	
2793	DS/HD 3½" 1.44 MB Diskette *(Qty. 10)*	21.
	Memory ... 2 year warranty ***(See page H)***	
8911	16 Meg Memory Upgrade Kit	895.
9284	1 MB SIMM *(80ns, set of 4)*	199.
8790	1 MB SIMM *(80ns)*	$57.
8910	4 MB SIMM *(80ns)*	225.
	Moustrak ... lifetime warranty	
8576	Black Mouse Pad *(7" x 9")*	8.
8548	Black Mouse Pad *(9" x 11")*	9.
2694	Blue Mouse Pad *(7" x 9")*	8.
2692	Blue Mouse Pad *(9" x 11")*	9.
2693	Blue Low Friction Mouse Pad *(9" x 11")*	10.
2699	Gray Mouse Pad *(7" x 9")*	8.
2697	Gray Mouse Pad *(9" x 11")*	9.
2698	Gray Low Friction Mouse Pad *(9" x 11")*	10.
	Pacific Micro ... 1 year warranty	
8244	External Hard Drive Enclosure	469.
	Safe Power Systems ... 2 yr. wrnty.	
4561	250 Power Backup	199.
6747	400S Power Backup	399.
4562	425 Power Backup	329.
	Sony ... 60 day MBG	
3298	DS/HD Disks 3½" 1.44 MB *(Qty. 10)*	18.
6375	DS/HD Disks 3½" 1.44 MB *(3 pack) (Qty. 30)*	49.
	SyQuest	
6592	Syquest Cartridge *(45 MB)*	74.
9728	Syquest Cartridge *(45 MB)* *(10 pack)*	699.
	Toshiba ... lifetime warranty ***(See page H)***	
9754	Toshiba 3½" ED Diskette *(Qty. 1)*	8.
9755	Toshiba 3½" ED Diskettes *(Qty. 10)*	79.
	3M ... lifetime warranty	
9802	DS/ED Disks 3½" 2.88 MB *(Qty. 10)*	89.
	Tripp Lite ... 2 year warranty	
7890	750W Battery Backup	469.
7889	1200W Battery Backup	669.
6018	LC1200 Line Conditioner	159.
6017	LC1800 Line Conditioner	209.

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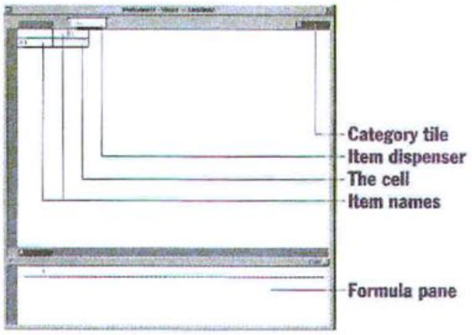
Building a Budget in Improv

by Darcy DiNucci

When Lotus built Improv, the development team re-thought the spreadsheet interface from the ground up. In the process, they took away some of the signposts people have come to take for granted when they work with speadsheet programs. Opening an Improv worksheet for the first time can be daunting. This tutorial will get you started with the program and familiarize you with the simple rules of the new interface.

Starting a new model in Improv brings up the simplest form of spreadsheet life, a one-celled spreadsheet (Figure 1). The item names (currently labeled A1 and B1) are linked to the categories (now named A and B) identified by the tiles on the corners of the worksheet. You'll see how in a few minutes.

Figure 1. **Opening Improv yields a one-cell spreadsheet.**



Building the structure

Click the A category tile, type "Line Item," and press Return. Your y-axis category is now named "Line Item," and the item names are changed to reflect the new identifier. Select the B category in the same way, type "Quarter," and press Return.

Improv worksheets contain only the cells that you need. You add cells by adding new items, using the Item Dispenser (Figure 2). Pull down four items with the Item Dispenser (by dragging the item label down), and tear them off (by dragging to the side). Drop them on Line Item1. Drag off four more items and drop them on Quarter1.

Click on Line Item1 and type "Revenue." In the same way, rename the other line items Salaries, Rent, Taxes, and Profit. Rename item Quarter5 as Total. Notice that the other items in this category are already named appropriately.

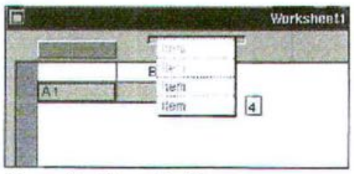
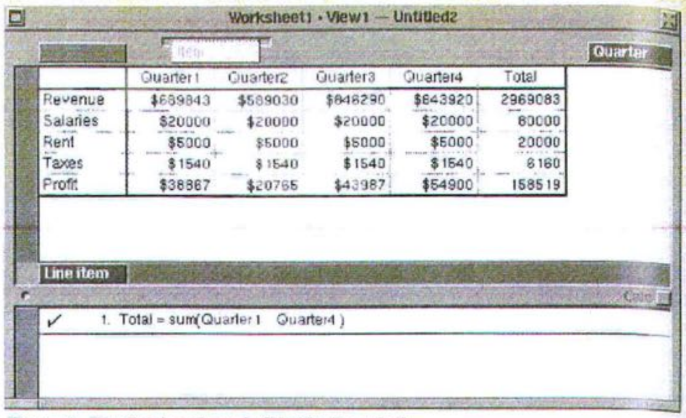


Figure 2. **Dispensing items**

Click in the Revenue cell in Quarter1, and enter the data shown in the Quarter columns in Figure 3 (type the numbers only, without dollar signs). Do likewise for the rest of the Units cells. You're doing something you can't do in traditional spreadsheets: typing directly into cells. In traditional sheets, both data and formulas belong to cells, so you must type into a kind of holding pen while the program waits to see whether you're entering data or a formula.

All the items in this spreadsheet should be formatted as currency. Select the line item names and click on the dollar sign ($) in the Format panel. Choose the number of decimal places by clicking on the number of decimals you want (in this case, none).



	Quarter1	Quarter2	Quarter3	Quarter4	Total
Revenue	$689843	$589030	$646290	$643920	2969083
Salaries	$20000	$20000	$20000	$20000	80000
Rent	$5000	$5000	$5000	$5000	20000
Taxes	$1540	$1540	$1540	$1540	6160
Profit	$38867	$20765	$43987	$54900	158519

✓ 1. Total = sum(Quarter1 Quarter4)

Figure 3. **The Totals column is filled by formula 1.**

Writing formulas

Now write a formula that sums the Quarter columns. Improv formats use a syntax like the one you're familiar with from traditional spreadsheets, with one difference: it uses plain English to name data, instead of naming the cells. You write the formula with Improv's many formula-writing tools in the Formula Pane, the lower section of an Improv worksheet window.

Double-click on the line labeled "1" in the Formula Pane to enter formula-writing mode (the pointer changes to white with a black border, and a formula bar appears above the pane). To sum the Quarter columns, click the Total item name in the worksheet. Then click = (on the formula bar), click Functions, select "sum(list)" in the Functions panel, and click Enter. Specify the list you want to sum by double-clicking the word "list" in the formula, dragging across the Quarter1 through Quarter4 item names, and pressing Return.

Notice that when you finish the formula, sums pop up in all of the Total cells. This effect points out an important difference in the way Improv treats formulas: instead of expressing cell geography, Improv formulas express the relationships of categories of data. In a traditional spreadsheet, you'd need a formula in each Total cell. Improv recognizes data by its name, anywhere it exists in the worksheet.

In managing the actual budget, you'll want to track the actual costs for each item and calculate the variance between the actual and planned numbers. You can do this in Improv by adding a second-level category.

To add a new category, first select the category name that you want to multiply (in this case, Quarter), by clicking it. Then choose Add Category in Improv's Edit menu. Another category tile, called A, appears above the Quarter tile, and the category name A1 appears above the Quarter titles. Click on the category tile and type the category name, Tracking.

Add two items to the new category. Rename the tracking items Plan, Actual, and Variance. Since you have forecast well and your actuals were exactly on plan, copy the numbers from the first category, Plan, into the Actual cells by selecting them and copying and pasting them into the new area. Select only the cells that contain numbers (not the Total cells, which are calculated by formulas).

Now create a formula for Variance. Select Formula 1 and press Enter (not Return), or select it and choose Add Formula from the Edit menu. (Notice that this is the same menu command you used to add a new category before. The command changes according to what kind of item you

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Hints and Tips

by CHUCK FARNHAM

Adobe Illustrator 3.0

Filename extensions You can make an Illustrator file available for placement as an EPS (Encapsulated PostScript) file in other applications by simply changing its extention from .ai to .eps. (EPS is the native format of Illustrator files.)

Instant selection tool You can access the selection tool while using another tool by holding down the Command key and deselecting the previously drawn object–particularly useful when you're setting multiple text blocks or objects. When you release the Command key, the cursor changes back to the Text tool insertion point.

Compound text objects Illustrator often draws a path in a direction you don't expect (the program controls the direction), which can cause problems when you're creating compound objects. You can reverse the direction of an individual object in a compound object by selecting the individual object with the Direct Select tool (the hollow arrow), then clicking the Reverse button in the Paint Style panel. If several objects in a compound are drawn in the wrong direction, try changing the backmost objects. (Note: If the Reverse button is dimmed, you have more than one object selected, and those objects have different direction attributes.)

Custom style palettes Preserve your favorite fonts, custom colors, patterns, and custom graph designs by creating a special template file. Save a file containing all the special features as Adobe_Illustrator_Startup.ai, and place it in your Adobe Illustrator directory. Then all new documents you create with the application will have those attributes available in their appropriate style panels. (Be careful, however: If you save too much information, the Illustrator application could slow down considerably.)

File information You can use Adobe Separator's File Info command (in the Panels menu) to reveal information about the contents of an Adobe Illustrator file, or any EPS file. File Info includes information about the file's creator, PS and EPSF versions, bounding box size, and fonts and patterns. Choose between General, Fonts, Patterns, and Files to display the information you need.

WordPerfect 1.0.1

Updating font lists Because of a peculiarity in the NeXT operating system, the .fontlist file in the LocalLibrary/Fonts directory may not be updated when you install new fonts, so the new fonts will not be visible when you open the Font panel. (This irregularity occurs only in the LocalLibrary/Fonts directory, not in any user-Library directories.)

You can update the .fontlist file yourself by using the Terminal application. Make sure you have write-access privileges to the LocalLibrary/Fonts directory, then open the Terminal application and type `buildafmdir/LocalLibrary/Fonts` inside the Terminal window.

TopDraw 1.0

Text in objects You can make text wrap to the boundaries of an irregularly shaped object by typing, pasting, or importing text into the object itself. To type the text, just double-click on the desired object and start typing. Paste text that was previously copied or cut from within TopDraw or another application by double-clicking on the object to set an insertion point, then using the Paste command. To import ASCII or RTF (Rich Text Format) text, use the Import option in the Window menu after double-clicking.

Printing workaround Documents that contain single span lines with arrowheads sometimes have trouble printing (it's a known bug). You can get the same effect using the Polyline tool, normally used for more complex outlined objects.

Perfect shapes The quickest way to create perfect squares and circles is to hold the Shift key while dragging out the rectangle or ellipse at a 45-degree angle. Holding the Shift key while dragging the mouse constrains the object so that it is drawn in specific angle increments. (Note: You can specify the value of those increments in the Preferences panel; default is 45 degrees.)

Aligning overlapping patterns TopDraw aligns patterns by starting from the lower left corner of the page rather than aligning them with the boundaries of the individual objects. This ensures that pattern fills within two overlapping objects will always align.

TextArt 1.0

Selecting images If you hold down the Alternate key while selecting a graphic in the Image Display window, the graphic is copied to the layout board. This will give you more control over the object, allowing you to get a tighter bounding box on it, add other graphics and text to it, or otherwise modify it. (If you select the graphic without pressing Alternate, the graphic is copied to the Pasteboard.)

Slider controls Alternate-Shift drag on a slider or circular slider to get fractional values, to obtain, for example, rotations like 12.93 degrees and incremental type point sizes like 12.5. Command-Click a slider to reset it to its default value. You can get values lower or higher than those accessible with the slider by typing the value into the slider's text field.

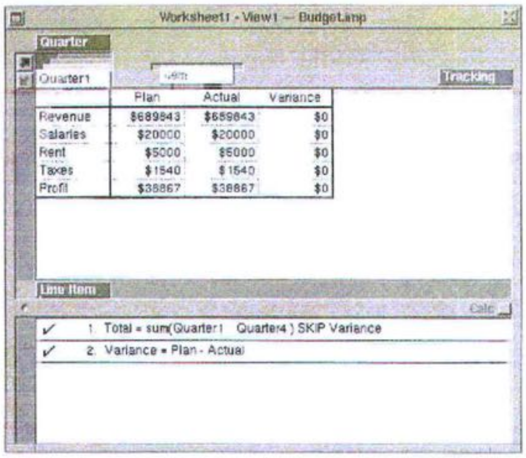
Cleaning up Command-O resets all special effects and hides the special effects windows–good for quick cleanup after you've stumbled into a particularly gruesome effect.

Thanks to the technical support staffs of the above applications for their help in compiling these tips and hints. For all their effort, these unsung heroes of the computer industry rarely receive credit from a public that is quick to call an 800 number only to find out that the problem they called about is covered on page 2 of the manual. To contribute to this column for future issues, send tips to cfarnham@nextworld.com.

CHUCK FARNHAM *is a hardware-support engineer and consultant specializing in teaching computer skills to individuals with developmental disabilities.*

[CONTINUED FROM PAGE 68]

have selected.) Build the formula by clicking Variance (in the worksheet), then = (in the formula bar), then Plan (in the worksheet), then ± (in the formula bar), then Actual (in the worksheet). Then press Return.



Quarter1

	Plan	Actual	Variance
Revenue	$689843	$689843	$0
Salaries	$20000	$20000	$0
Rent	$5000	$5000	$0
Taxes	$1540	$1540	$0
Profit	$38867	$38867	$0

✓ 1. Total = sum(Quarter1 Quarter4) SKIP Variance

✓ 2. Variance = Plan - Actual

Figure 4. **By dragging a category tile to the third axis, you create a three-dimensional model.**

At the left of both formulas, you will now notice a new symbol, the overlap symbol. This appears because the two formulas are trying to calculate the Total Variance (Formula 1 by adding Quarter1 through 4 in Variance; Formula 2 by subtracting Actual's Total from Plan's Total). In traditional spreadsheets, the last formula in a cell takes precedence, but Improv tells you explicitly what's happening and gives you control over the resolution.

Click the overlap symbol for Formula 2. In the Overlap panel, click OK (use of Formula 2 is preselected). A skip clause reading "SKIP Variance: Total" is added to Formula 1.

NeXT Question

Q: WriteNow's date stamps–both the fixed and updating markers–put zeros in front of single-digit dates. For example, February 2 displays "Feb 02, 1990." Under 1.0, it displayed "Feb 2, 1990," a much more elegant rendering. Is there any way to remove the leading zero under 2.0?

J.D. Levine
Shaker Heights, OH

A: *WriteNow currently makes sure that the length of the date entry is always the same by appending a leading zero when the day of the month is only one digit. If you prefer the date to be one digit, you can chose the Fixed Text option, then edit it to remove the leading zero. With updating markers, you're stuck with the leading zero.*

–Andreas Sautter, NeXT Technical Support

Different views

Now your boss says, "Great, but what I'd really like to see is Plan, Actual, and Variance by quarter." On a traditional worksheet, you'd be out of luck, because once formulas are in place it's impossible to fundamentally rearrange your view of the sheet without breaking the formulas. Because Improv formulas are attached to data names and not to cell geography, the sheet can be rearranged at will. You can have up to four categories on each of the three axes and rearrange them to your heart's content.

To appease your boss, drag the Tracking tile to below Quarter at the top right corner of the worksheet. The sheet is automatically rearranged, and all the formulas still work. You can create as many views as you have categories. To view the line items by Quarter, drag the Quarter tile into position in front of the Line Item tile.

To view the data one item at a time, drag the Quarter tile into position over the unused tile in the top left corner of the window (Figure 4). You can scroll through the quarters by clicking the arrows to the left of the tile.

Improv features you haven't seen here allow you to group items to create subcategories and subtotals, then collapse the groups as you would collapse and expand groups in an outliner, to get summarized views of the data. Another feature lets you save different views of a set of data, then open them from a model browser window.

Improv's extensive documentation and on-line help will guide you through those and other additional features. What you've seen here should give you an idea of the uses of named data, and what to do when you see a one-cell spreadsheet. ◆

DARCY DINUCCI *is the managing editor of* NeXTWORLD.

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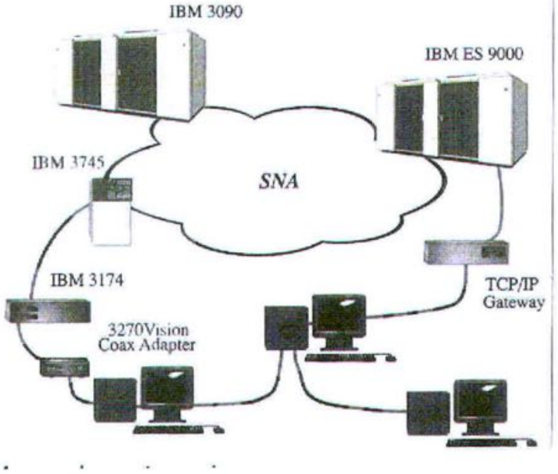

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Linking Into the Internet

by Daniel Miles Kehoe & Seth T. Ross

Any NeXT computer–in fact, any UNIX computer–will let you and your organization plug into the planet. Though it seems like futuristic fiction to those who've never participated, many NeXT users routinely connect to a global computer network. The net result is very practical: essential resources for your company.

With a planetary link in place, your company is no longer limited to e-mail within a local area network. You can exchange electronic mail with anyone who's plugged into the worldwide network, including many other NeXT users. You may arrange to receive a Usenet news feed, including access to the comp.sys.next bulletin board, which delivers as many as a hundred postings a day of NeXT-related tips, tricks, rumors, queries, and idle chatter. Or you may wish to receive a news feed from ClariNet, which delivers newspaper wire services in electronic form. Finally, the link gives you the ability to access public archive servers containing libraries of freeware, shareware, and accumulated NeXT wisdom.

The keys to the planet start with UUCP (UNIX to UNIX Copy), UNIX utilities that automate telecommunication between computers. UUCP utilities are included with every NeXT computer. This article will show you how to set up a UUCP link to the Internet, the backbone of the planetary network.

The view from space

An internet (in lowercase letters) is a simple combination of two or more local area networks. But there's only one "capital-I" Internet: a vast agglomerate of regional networks established by universities and research institutions, increasingly used by commercial organizations (see "Quick and to the Point," *NeXTWORLD* April 1991). A UUCP connection isn't actually "on the net," but with a UUCP link you can reach any Internet site (and other UUCP users) through a hub service, a service provider that transfers mail and news from the Internet backbone.

In North America, both UUNET Technologies and Performance Systems International (PSI) provide nationwide hub services to commercial organizations. Local hub services also offer access to the commercial Internet backbone. An individual or a company can establish a link with UUNET, PSI, a local hub service–or a friend with a link (the research community has built a nest of informal UUCP links). Costs generally run about $25 to $35 per month; some services also charge hourly connect charges. If you work for a university or research organization, you may use the CREN CSNET service. Table 1 shows your choices for hub services in large American cities.

Keys to the planet

All computers that use the UNIX operating system come equipped with the utilities needed for unattended computer-to-computer communication. By configuring several system files and linking together two computers via modem, you can transfer files, run applications remotely, and exchange electronic mail.

UUCP is not a single application. A background program, or daemon, is responsible for UUCP's unattended file transfers and remote execution requests. The daemon can do nothing without its companion system files. The most important system file is /etc/uucp/L.sys, which contains the list of your machine's planetwide connections and instructions on how to reach them. A second important system file is /etc/uucp/L-devices, which establishes a correspondence between device names in L.sys and the particular configuration of modem, baud rate, and port that is used for a dial-out link.

Sendmail (the UNIX mail-transfer agent that underlies NeXTmail) and tip (the UNIX utility for dial out and remote login) are not part of the UUCP suite; however, sendmail must be configured when UUCP connections are established, and tip is useful in the initial configuration of a modem.

Setting up a UUCP link

You can try to set up a UUCP link with a generic Hayes-compatible modem and a Mac-to-modem serial cable, but that path can be risky. It's better to purchase a NeXT-specific serial cable. If you expect to receive a lot of mail or news you'll want to invest in a fast modem.

The steps of a UUCP installation are shown in the sidebar "A UUCP Installation Plan." Before you get started, you may want to consult Chapter 14 of the *NeXT Network and System Administration* manual, which is particularly helpful.

If you encounter difficulties, they will likely be caused by problems with permissions (the owner and group assigned to a file) or errors in the

TABLE 1: UUCP HUB SERVICES

CITY	ORGANIZATION
CALIFORNIA	
Cupertino	Portal Communications
Los Angeles	PSI
Menlo Park	Anterior Technology
Mountain View	PSI
Santa Clara	PSI
COLORADO	
Colorado Springs	Colorado SuperNet
Denver	Colorado SuperNet
Denver	PSI
Fort Collins	Colorado SuperNet
CONNECTICUT	
Hartford	PSI
GEORGIA	
Atlanta	PSI
ILLINOIS	
Chicago	/usr/group/chicago
Chicago	PSI
MASSACHUSETTS	
Boston	PSI
MICHIGAN	
Detroit	PSI
NEW JERSEY	
Newark	PSI
Trenton	PSI
NEW YORK	
Albany	PSI
Buffalo	PSI
Islip	PSI
New York	PSI
Rochester	PSI
Syracuse	PSI
White Plains	PSI
OREGON	
Portland	PSI
PENNSYLVANIA	
Philadelphia	PSI
Pittsburgh	PSI
TEXAS	
Dallas	PSI
Houston	PSI
VIRGINIA	
Falls Church	UUNET
Reston	PSI
OTHER U.S. CITIES	
Various	UUNET

L.sys and L-devices files. Help is readily available. Possible sources are the technical support staff at a hub service or a neighboring site's system administrator.

You are using a NeXT computer, so it's reasonable to ask if you can set up a UUCP link without employing the UNIX black arts. You can. RightBrain Software is developing a point-and-click application called UUCP Manager. And Neuron's Fax96+ modem ($1095) comes bundled with UUCP-installation software. Before you take the shortcuts, though, make sure you understand the issues. A company's UUCP link is critical, and a dedicated system administrator will want to understand UUCP's hidden machinery. Read on.

A UUCP Installation Plan

Steps	Time
1. Connect your NeXT to a modem; test dial-out	1–5 hrs.
2. Sign up with a hub service or find a friendly UUCP neighbor	1–2 hrs.
3. Add your hub service to the L.sys file	15 min.
4. Edit the L-devices file to describe your modem	15 min.
5. Configure the sendmail.cf file	1–2 hrs.
6. Test the mail link	5 min.

Name and address, please

Every mail server on the Internet has a registered name and mailing address. Computers linked via UUCP should be registered, too.

If just one computer will be the mail host in your organization, use the name of your company or a recognizable abbreviation of your company's name. The name must be unique if you want mail to find your users. Your hub service will check Internet and UUCP maps to see if the name is already in use (ask an expert for help if you're not working with a hub service). You may want to reconfigure your NetInfo server with the mail server name as the host name if the host is not already appropriately named.

You must register your company's mail host name within an Internet domain, which functions as an address for mail routing. Six domains are defined by tradition: .com, .edu, .gov, .mil, .net, and .org (company, education, government, military, network hub, and nonprofit organization, respectively). If your company has geographically dispersed offices, you may wish to register in the .com domain. Alternatively, you can use a country domain, which provides a geographical heirarchy of organization and location. Many smaller American companies, and individuals, register in the .us domain. Commercial hub services will register your mail host name and domain for you. If you are setting up your own link, contact the .com domain name registrar at the Network Information Center at SRI International or the .us domain name registrar at the Information Sciences Institute.

Configuring files

Now, down to editing the system files.

You must log in as root before you start. Start up the Edit application and open /etc/uucp/L.sys, your first target. Ask your hub service for the information you need to customize the file. Edit the file to look something like this:

```
#L-sys: Please read UUAIDS/L-sys.samples for some
#discussions on how to use this file as well as the
#documentation that can be found in the Digital Librarian on
#uucp.
#
uunet Any DIR 19200 cua\
  ""\r\r\
  ""AT\
  ""AT&FQ0E1V1\
  OK ATS7=60S61=0S50=255S52=2S58=0S110=1S111=30S131=1\
  OK\dATDTw,9,18008776550\
  FAST~75\r\
ogin:~10-\r-ogin:~20 Unextwrld\
sword: 0
```

In this example, the authors set up a UUCP link using a Telebit T2500 modem to the host "uunet" at UUNET Technologies. Substitute your hub service's hostname for "uunet" (in the first line), and the hub service's phone number for "18008776550" (UUNET's data number, in the sixth line). In addition, you'll indicate your modem's speed ("19200" in our example) and port ("cua," corresponding to serial port A, in the first line). The fifth line sets the modem's registers, configuring the Telebit's speed and data-exchange protocols. If you're using an ordinary Hayes-compatible modem, a simple ATd18008776550 dialing sequence will suffice. Your hub service will provide a login sequence for the last two lines, which will include your login name at the hub service ("Unextwrld" in our example) and a password ("0" here).

A word to the wise: Avoid frustration later by making sure there is a comment character (#) at the beginning of blank lines or lines you have not added yourself. Blank lines in your L.sys file can mysteriously sabotage UUCP links.

Left to your own devices

Next you must edit the file /etc/uucp/L-devices. This file provides specific information to UUCP about the modem's device port and its capabilities. The DIR flag in the first line of the L.sys file must have a corresponding line in the L-devices file. If you're using a fast modem, use the following line:

```
DIR cua unused 19200 direct
```

If you're using serial port B, substitute "cub" for "cua." If your modem does not run at 19,200 baud, substitute the correct baud rate. You may wish to comment out all other lines in the file by entering a # character at the beginning of each line.

If you have a 68040-based NeXT computer, you'll want to take advantage of the faster throughput offered by hardware flow control. You'll replace references to the cua or cub serial port drivers with "cufa" or "cufb." But first you must be sure you are using a modem that supports hardware flow control (not all do), and you must be certain that the L.sys file contains a sequence that sets the modem's registers to enable use of hardware flow control. Sophisticated users can eliminate the complex modem-setup string in the L.sys file by calling a stored profile in the modem; if you're just starting, don't bother.

Permissions, please

Before you test your UUCP connection, you'll need to deal with UNIX file permissions. You edited L.sys and L-devices as root, a member of the wheel group. But the files must belong to a user named "uucp," of the daemon group. Every time the L.sys and L-devices files are edited and saved, you must chown the owner and group. It's easy to do. Launch a Terminal window and enter the commands

```
cd /etc/uucp
ls -lg
chown uucp.daemon L.sys
chown uucp.daemon L-devices
ls -lg
```

The first command moves you to the /etc/uucp directory. The second command shows a list of the files with their owners and groups (you'll see root and wheel associated with the two files you edited). The chown commands change the owner and group. And the final "ls -lg" shows the changes you made. Avoid trouble later by verifying that the L.sys and L-devices permissions are -rw——— or -r——— (that is, modifiable only by the owner).

A trial run

To dial out using your modem, you'll have to match modem, cable, and the /etc/remote file to enable simple communication. Use the UNIX tip utility to check your connection to your hub service. Run tip from a Terminal window using the following command:

```
tip -19200 18008776550
```

replacing "-19200" with the speed of your modem, and replacing UUNET's phone number ("18008776550") with the phone number of your hub service. If you encounter error messages, refer to the manual pages for tip (type "man tip" in the Terminal window) and check the entries in your /etc/remote file.

If tip runs successfully, test your UUCP link. Exit tip by typing ~. Then, in the Terminal window, enter

```
cd /usr/lib/uucp
ls
uucico -r1 -x5 -suunet
```

(substitute your hub service host name for the string "uunet" above). The first command moves you to the directory where uucico hides, and the second command lists the contents of the directory so you'll know you're in the right place. Enter the uucico command, and UUCP status messages will roll up your Terminal window–with any luck, showing a successful connection. If the connection cannot be established, the status messages will serve as guideposts to your hub service's technical support staff in troubleshooting.

Keep your fingers crossed when first testing the UUCP link. If something goes wrong, it will be time-consuming to identify and correct, because there are many variables to isolate. In troubleshooting, first check the entries and permissions in the L.sys and L-devices files. Recognize that if you cannot manually dial out with tip, UUCP will not work automatically. Complex problems may require reference to the *NeXT Network and System Administration* manual, man pages, and sample L.sys and L-devices files found in the directory /etc/uucp/UUAIDS.

The black magic

With a working UUCP link, just one roadblock stands in the way of you communicating with the world: sendmail. Don't even try to understand the format of the sendmail.cf file; it's not worth the trouble. Start up Edit and open the file /etc/sendmail/sendmail.cf. Near the top of the file (around line 30), you'll see the line

```
DMuucp
```

which tells sendmail that mail destined for a machine off the local network

Hints and Tips

Standard network time

On a small local area network, one server will likely be used to maintain the correct time and date (servers connected to the Internet typically use an ntp service). This master time server synchronizes the time on the client computers. After time changes and power outages, however, you can't set the time using the clock panel in the Preferences application, either on the master server or on the client machines. Instead, you'll need to use the date command in a Terminal window on the master time server. The form of the command is

```
date yymmddhhmm[.ss]
```

For example, to change the time and date to 5 a.m. September 1, 1991, you would issue the command

```
date 9109010500
```

Changing logins

If you are logged in to a Terminal window as root and need to do something as a normal user to avoid creating mayhem, use the suspend command. This will effectively log the session in under the original user's name. To continue as root, type "fg."

Easy backup

Back up hard disks conscientiously! The best method is the dump utility, which offers an incremental backup approach, copying only files that have been modified since the last backup.

The dump utility has nine levels of backup. Level 0 copies the entire file system, and each subsequent dump level copies those files that have been modified since the most recent dump with a level number lower than the current dump. (For example, a level 6 dump copies all files changed since the most recent dump with a level of 5 or greater.)

Two caveats. Run dump as a member of the operator group but not as root. This will protect against wiping the disk through a typing error or other mishap. Also, be sure to run a fsck before doing a level 0 dump. This will check the hard drive for file system corruption.

The following dump command backs up an entire file system (level 0), where "/dev/rsd0a" is the file system:

```
dump 0u /dev/rsd0a
```

The u option causes dump to record the date, time, and level at which the file system was backed up, in the file /etc/dumpdates.

The optical disks in use with the original NeXTcube (and now supported as a drive option) make excellent backup devices. Dump will also work with the extended-density (ED) 2.88MB floppy disks supported by all of NeXT's new computers.

To perform a level 9 dump to an internal floppy disk, use a command of the following form:

```
dump 90f 2.6 /dev/rfd0a
```

where "O" specifies floppy disk, "2.6" specifies the capacity (formatted) of the disk, and "/dev/rfd0a" specifies the floppy drive device.

You can specify a dump to the standard output by using a file name of– (hyphen); try compressing the dump file so it takes up less space. For example,

```
dump 9uf - /dev/rsd0a | compress > /Dumps/sd0a-9.dump.Z
```

does a level 9 dump on /dev/rsd0b and sends the output to compress, which in turn writes to a folder on the Dumps optical disk. Note that the name of the resulting file has the .Z suffix, which indicates that the file is compressed. Use the uncompress command to recover the original, full-size file.

Please send any tips you'd like to share to kehoross@nextworld.com.

should be forwarded using the UNIX UUCP facility as a mailer. You must specify the name of the host at your hub service by finding the lines

```
DR mail-relay
CR mail-relay
```

and changing "mail-relay" to the hub service host name (in our sample sendmail.cf file, "uunet").

The default sendmail.cf file supplied with your NeXT is intended for mail hosts that are actually on the Internet (Internet machines use a beast called the ddn mailer rather than UUCP). Since your link to the planet uses UUCP, you must make further modifications to your sendmail.cf file. Deep down in the file, around line 323, you'll find the following seven lines:

```
# If you want to pass all other explicit domain names up the ladder
# to our forwarder then uncomment the following line.
#R$*<@$*.$+>$*                          $#$M  $@$R
$:$1<@$2.$3>$4                          user@any.domain
# and comment out this one.
R$*<@$+.$->$*                           $#ddn $@ $2.$3
$:$1<@$2.$3>$4                          user@any.domain
```

that describe how to forward nonlocal mail. The instructions are explicit: remove the "#" from line three and add "#" to the beginning of line six.

Then remove the "U" from the following line:

```
Muucp,                                  P=/usr/bin/uux, F=ms
DFMhuU, S=13, R=23, A=uux - -r $h!rmail ($u)
```

With U in place, you can send mail, but you may get an erroneous warning that the mail was never delivered.

None of this may be necessary if your hub service supplies you with a preconfigured sendmail.cf file. If your hub service routinely supports NeXT users, the service will have the proper file on hand and will be able to load it on your computer as soon as the UUCP link is in place.

Plugging into the planet

With a UUCP link that is known to work, and the required changes to the sendmail.cf file, you'll simply enter

```
uupoll -n uunet
```

in the Terminal window whenever you wish to check the hub service for mail (substitute the name of your hub service host for "uunet"). The modem's lights will blink, and mail messages will appear when New Mail is selected in the Utilities menu of the NeXTmail application. Select Deliver after you have composed a message, and the message will be spooled for delivery at the next polling of your hub service. You're plugged into the planet! ◆

The authors invite you to send a short text message when you've succeeded in establishing your UUCP link (our address is below). We'd love to see that you've joined us.

DANIEL MILES KEHOE AND SETH T. ROSS *are contributing editors for* NeXTWORLD. *They can be reached at dkehoe@nextworld.com or sross@nextworld.com. Thanks to Dick Benster, Geoff Goodfellow, Alan Marcum, Jiro Nakamura, Robert Nielsen, Glenn Reid, Roger Rosner, and Michael Rutman for their assistance with this article.*

NeXT Question

Q: Consider the following hookup: My NeXT computer is linked by telephone to a non-NeXT computer which is connected to the Internet. How can I send and receive NeXTmail (voice, EPS, and so on) with other NeXT computers linked to the Internet?

John Van Heteren
San Francisco, CA

A: *If you are already receiving ASCII mail, there is nothing that needs to be done separately to enable you to receive NeXTmail with voice or other attachments. It just works. NeXTmail will encode the format of the message so that it can be sent through standard mail facilities such as those used on the Internet. On the receiving end, NeXTmail decodes the message as needed. To send mail to users on non-NeXT machines, use the Non-NeXT option in NeXTmail's Send window.*

— Andreas Sautter, NeXT Technical Support

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519/884-7473; e-mail: info@clarinet.com

Colorado SuperNet
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303/273-3471; e-mail: kharmon@csn.org

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617/873-2777; e-mail: cic@sh.cs.net

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609/243-7538; e-mail: dan@neuron.portal.com

Performance Systems International
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703/620-6651, 800/827-7482; e-mail: all-info@psi.com

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408/973-9111; e-mail: jel@corp.portal.com

Telebit T2500 modem ($1345)
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408/734-4333; e-mail: netblazer@telebit.com

U.S. Domain Registrar
Information Sciences Institute, 4676 Admiralty Way #1001, Marina Del Ray, CA 90292
213/822-1511; e-mail: westine@isi.edu

UUCP Manager
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415/326-2974, 800/472-7246; e-mail: info@heaven.woodside.ca.us

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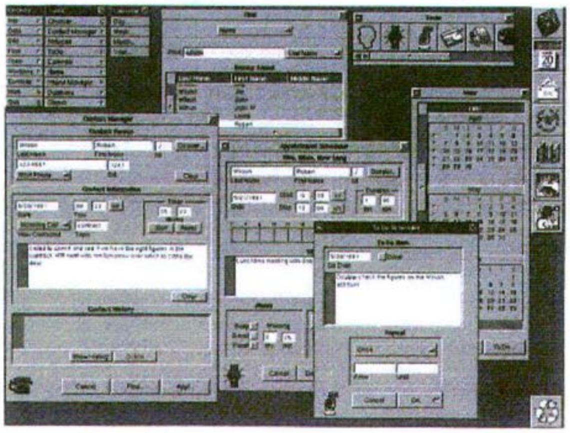

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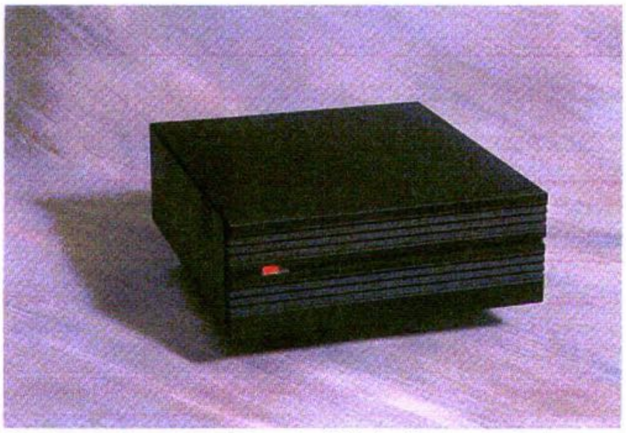

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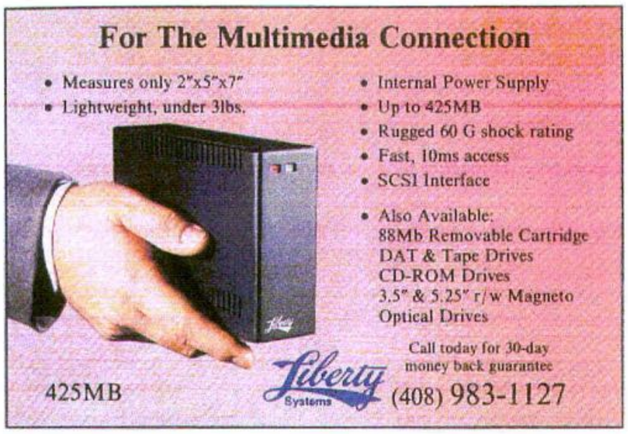

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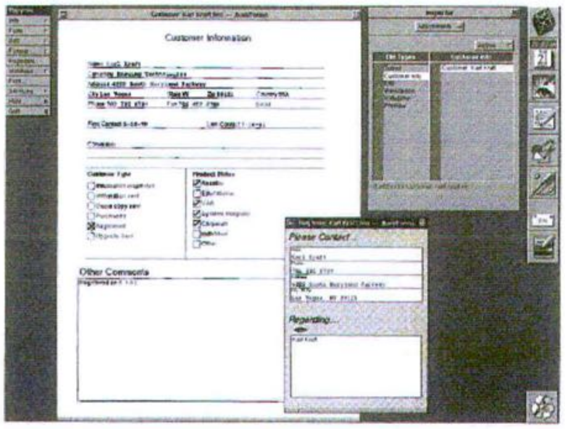

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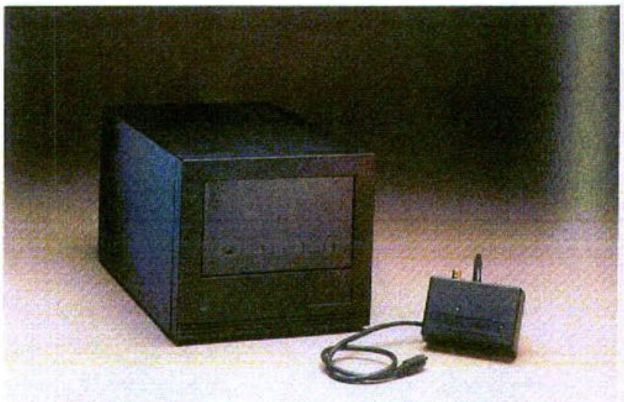

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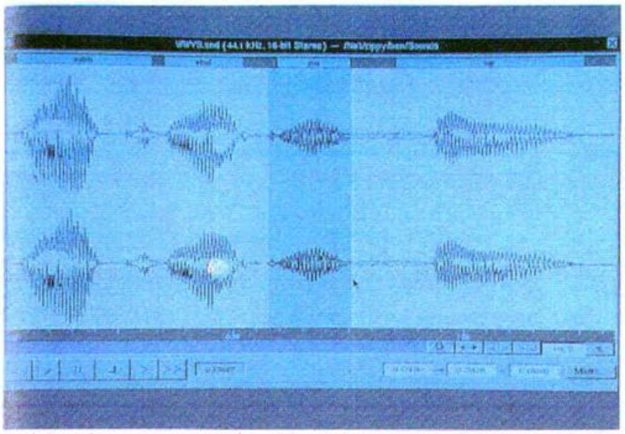

and then change it around, if you like. In fact, the SoundWorks™ software package gives you complete control over sounds you use on your NeXT™ computer.

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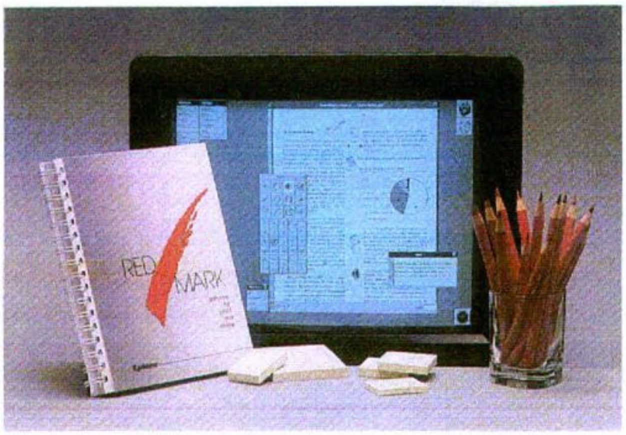

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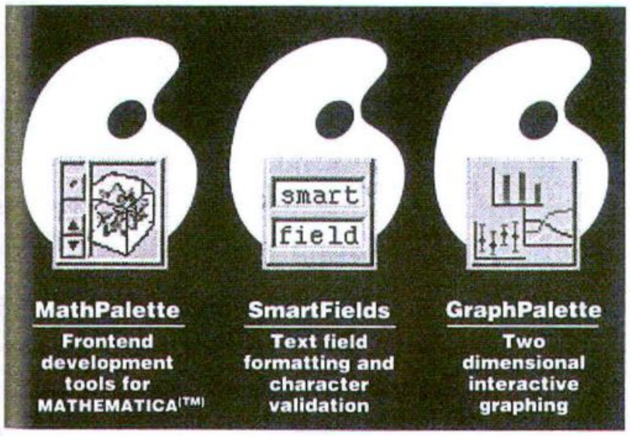
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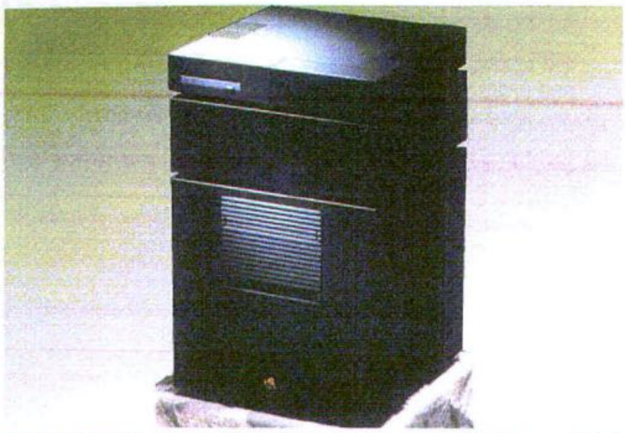

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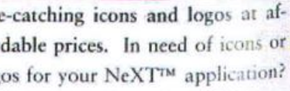

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program. There seemed to be no way to automatically resolve them. When Improv detected a conflict, it invalidated both formulas and complained to the user. Yes, sometimes formulas were not very nice.

"Jobs said, 'This is not a weakness, it is a great feature!' " remembers Kleppner. "With 1-2-3, you can copy and blow away a formula." The fact that Improv could automatically detect conflicts and tell the user about them was a major step forward.

As the product matured, many commands held over from the OS/2 version were eliminated. Meanwhile, the Help system and the Presentation Builder were developed as separate application programs (the Help system was later integrated into Improv). Forty people, including 13 developers, were working on the project. All of the pieces were falling into place.

Back in Redwood City, California, NeXT was struggling to get the NeXTstep 2.0 operating system completed. Originally, the project was called "Warp 9," because that was how fast the NeXT development team had to get it out. As the summer of 1990 progressed, the Back Bay group received a variety of NeXTstep prereleases: Warp 2, Warp 3, Warp 3i, and finally Magenta. "Not only was it a new version; it had a new numbering scheme!" exclaims Kleppner.

Other changes–as well as bugs introduced in intermediate releases–were far more serious. One bug in the memory allocation scheme caused the malloc() function–and all of Improv–to run incredibly slowly. Another bug with the Mail application prevented people from sending documents.

Then, a few weeks before the rollout of the new NeXT machines, the NeXTstep text object changed completely–a real problem for Improv's Presentation Builder. "We had spent a fair amount of time optimizing the old one," says Olsen. Days before the announcement, nobody knew if Improv's graphs would have text on them or not.

By introduction day, they did.

During the following months, the newly named Improv group shipped out their beta release of the program. The final version started shipping in February 1991.

Once again, Steve Jobs sent flowers to the developers. Only this time, it was truckloads. A dozen large bouquets came, along with many small ones. "There was one bouquet that was five feet tall–the size of a short doc writer," says Urgotis.

> "It's not the typical Lotus, where we sit in our ivory tower and run ads. We need the feedback."

What's next?

Probably the most-asked question about Improv is whether Lotus plans to develop versions for other platforms.

"We are all mindful of the higher revenue opportunities in the [Microsoft] Windows environment," says King, hinting that the development group is already fairly far along the preliminary design stages of the project.

But designing a user interface with Windows development tools is a problem, says King. "There is no doubt in my mind that if we had started to do Improv on Windows, we wouldn't be as far along as we are now. NeXTstep is the most productive development environment for graphical applications, bar none."

Meanwhile, the Improv group is willing to talk only about support of the existing NeXT product. Foremost on the agenda is listening to users' reactions. Lotus has set up a hotline for direct user input, something that is very unusual for Lotus. The company also produces a user newsletter and is conducting extensive interviews to find out what users like about the program and what they want changed.

"It's not the typical Lotus, where we sit in our ivory tower and run ads," says Anderholm. "We need the feedback."

Already, users have made it very clear that Improv needs macros and an Undo capability. But more than that, says Anderholm, "We have to figure out what we can add to the product to help people learn it, because you have to unlearn what you know about conventional spreadsheets like Excel and 1-2-3.

"Our challenge is to convince people that the benefits of this new spreadsheet are worth the cost of switching." ◆

SIMSON L. GARFINKEL *is a Senior Editor at* NeXTWORLD.

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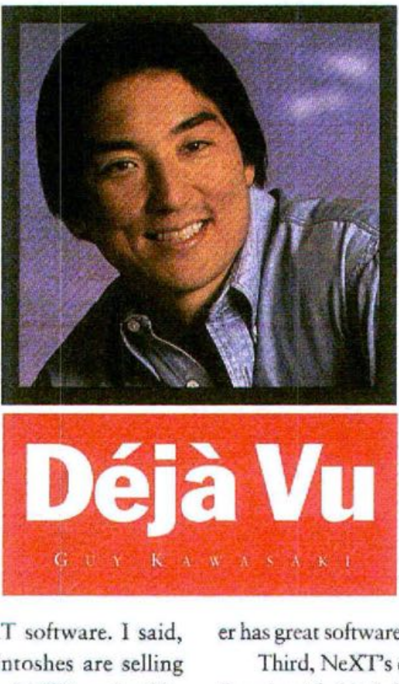

Déjà Vu

GUY KAWASAKI

"NeXT Computer. This is Ellen."

"Hi. I'm a Macintosh developer, and I'd like to get information about writing software for the NeXT."

"Okay, one moment please."

"Hello. This is Susan."

"Can I get information about writing software for the NeXT? I'm currently a Macintosh developer."

"The first step is for you to fill out an application to become a certified developer for us, and I'd be happy to send you an application."

Elapsed time: 45 seconds. Already, I knew I was in trouble. *NeXTWORLD* had asked me to write a column about NeXT's efforts to evangelize third-party software and hardware developers, and I was set to write a scathing report about NeXT's arrogant, unresponsive, yellow-tie evangelists (NeXT calls them "advocates") who wouldn't be able to evangelize Christianity if they'd seen the resurrection.

This preconception was a misconception. I found, much to my disappointment, that NeXT evangelism is among the best in the computer industry. In fact, much of NeXT's evangelism is reminiscent of the heyday of Macintosh evangelism in 1984 and 1985. I'm a pragmatist: If you can't criticize someone, you might as well claim that they're as good as you were.

NeXT evangelism starts at the top–or near the top. The person in charge of developer programs at NeXT is a vice president who reports to Steve himself. This is a big deal because it shows that developers are as important to NeXT as R&D, sales, and finance. (This isn't reminiscent for me. The highest I could get at Apple was a director–and then only if Jim Manzi, Ed Esber, and Bill Gates approved.)

In evangelism as in sex, position and size aren't the key. What counts is performance, and NeXT's evangelists are exemplary. Here's why.

First, the evangelists really believe what they are saying. I had a role-playing session in which two evangelists tried to convince me to do NeXT software. I said, "You're only selling 3000 units a month. Macintoshes are selling 100,000 per month. How can I make money doing a NeXT product?"

They said: "NeXT is the direction for the future of computing. We represent a growing marketplace when other manufacturers are flat. You can be on the leading edge of computing, which will help you with your products on the other platforms. Though we have smaller run rates, you can penetrate more of the market because there is less noise."

It doesn't matter whether these reasons are true or not. Good developers want to write software for a computer before it's rational anyway, and all they want to hear is reinforcement of their unfounded decision. The most important thing is that evangelists believe their own crap, and that NeXT evangelists certainly do. (To tell you the truth, Macintosh evangelism succeeded because we were too dumb and naive to know that it shouldn't.)

Second, the evangelists know how to use reality distortion. The evangelists told me that NeXT has a 50 percent market share of the "professional workstation" market. You've got to love this malarkey: define a new market by subtracting the (Sun) workstations sold for engineering and scientific uses, so that you can claim an impressive market share. (The Japanese have a saying: "If you can't make the numerator rarger, make the denominator smarrer.") Why, if NeXT defined a market for professional workstations with black cases, they could claim 100 percent market share.

Third, the evangelists have the right attitude: "Ask forgiveness, not permission." That is, they will do special things for developers, such as sliding them loaner equipment, giving them free passes to developer training, and paying expenses for them to visit NeXT. These kinds of actions, though they seem inconsequential, foster loyalty to a company.

Talk is cheap, so I asked the evangelists for references. In real time, the NeXT evangelists rattled off three developers and their phone numbers. (The fact that they had the phone numbers memorized is significant.) These references checked out, although I wonder what would have happened if I had called other developers.

Fourth, the evangelists know how to play their cards. It's common for evangelists to get NeXT's engineers and managers to meet with developers to hear their concerns, and to offer technical advice. I asked, hypothetically, if Steve (the ace in the deck) would come to my NeXT product announcement. The answer was an immediate "Yes." To a developer, this is the equivalent of the Pope agreeing to baptize your child–before it is born.

Finally, NeXT has created effective developer programs and tools, including a developer training course that's run twice a month in California, once a month in Pittsburgh, and once a month in Europe; a ten-volume documentation guide to writing NeXT software; and on-line bulletin board support. It's not only informative, it's also reassuring to developers that such programs and tools exist.

Okay, I hear you saying, "If NeXT evangelism is so good, why is there so little software?" I've been in this position before, so let me explain. First, it always takes two to three years to get software. Always. Nothing can change this. Second, from the time a computer has great software, it takes another year for the industry to recognize this.

Third, NeXT's evangelism wasn't always this good. NeXT initially had the misguided belief that it was a privilege and an honor to do NeXT software. It's funny how a few bad quarters change one's perspective.

Here's the bottom line: Around the time that Sun's engineering and scientific markets have dried up and Microsoft has sucked the marrow out of Silicon Graphics's bones, there will be a broad selection of productivity software for NeXT. Then, largely because of evangelism, NeXT will eclipse Sun as the dominant workstation manufacturer.

There's one more reason. Medicine will cure death and government will repeal taxes before Steve will fail. You can quote me. ◆

GUY KAWASAKI, *former director of software product management at Apple Computer, was responsible for the relationship between Apple and its developers. His new book,* Selling the Dream *(Harper Collins), explains how to evangelize products, companies, and ideas.*

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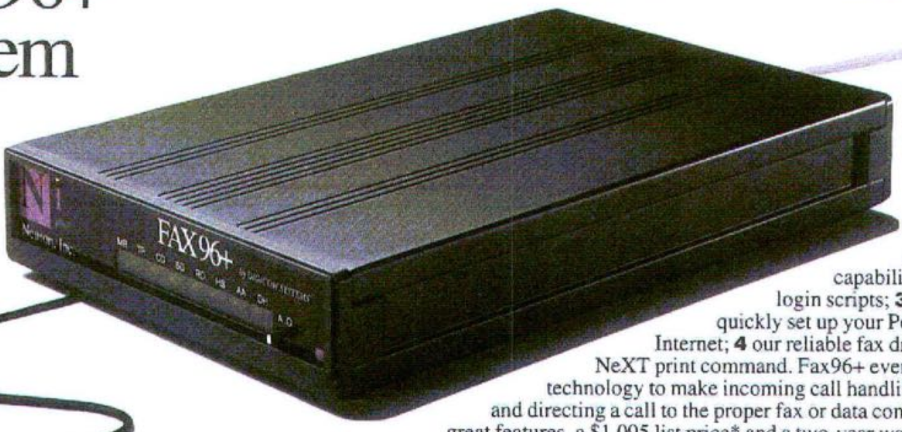

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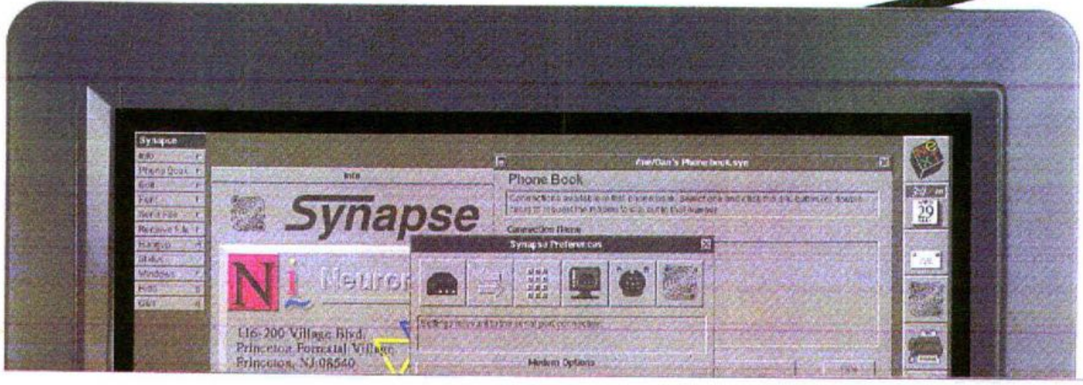

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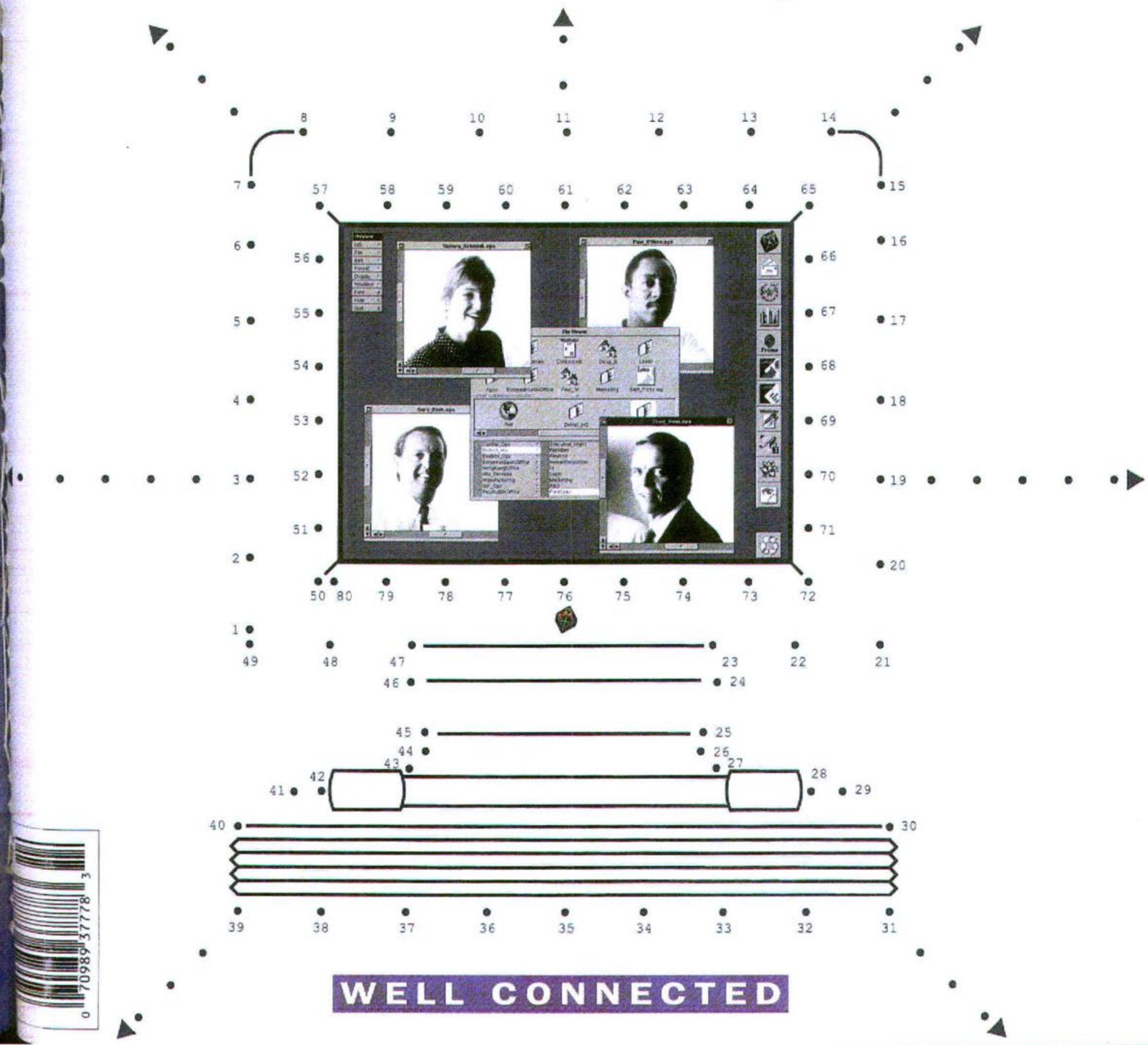
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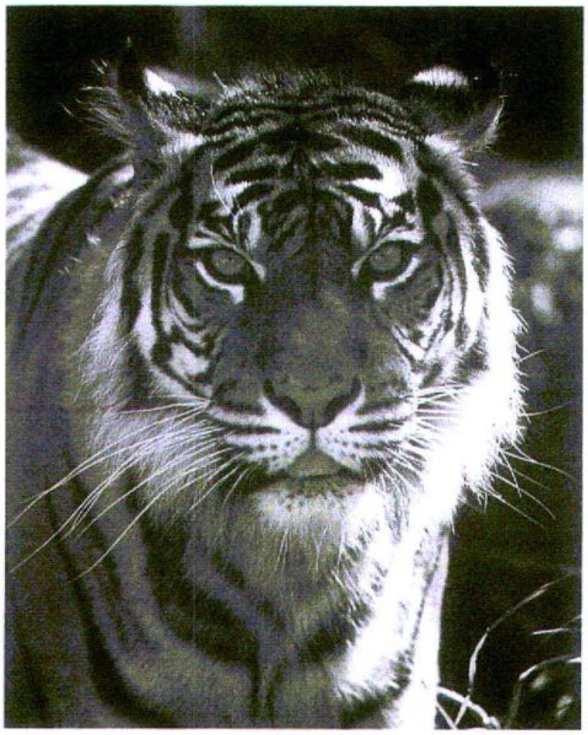

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NEXTWORLD
Winter 1991, Volume 1, Issue 4

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NeXTWORLD

Vol. 1, No. 4 *WINTER 1991*

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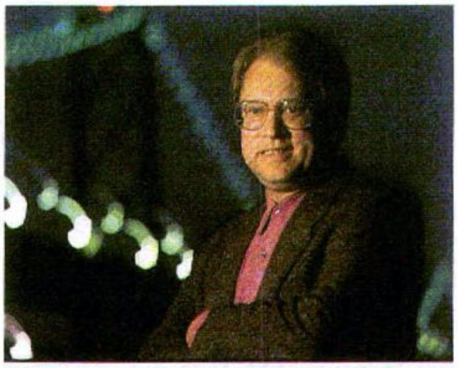
DAN RUBY

Geopolitical changes can happen suddenly, but their impact doesn't settle for a long time. The Berlin Wall came down in a week, but the New World Order has a long way to go. IBM and Apple stood up in public, but a new object-oriented operating system standard is quite a few years off.

There will be plenty more shocks and shifts in the landscape before the future terrain of the desktop computer market is determined. A process has been set in motion, in part by NeXT's leadership, but mainly by the inevitable forces of technology and business.

On these shifting sands, NeXT still has the opportunity to emerge as an important player. But it has to be nimble – prepared to discard strategies that aren't working, ready to seize any advantage it can find. It may not be able to plot a course with certainty, but by reacting quickly, NeXT can ensure itself a significant place in the future industry alignment.

NeXT's IBM deal is apparently finished, but the problem that originally led it to license NeXTstep still exists. The small number of systems sold by NeXT is insufficient to convince major software publishers to develop for NeXTstep. Without sufficient software support, NeXT cannot sell a large number of systems.



GRAPH BY VOLDI TANNER

The way out of this Catch-22 is to put NeXTstep on other hardware platforms. That was the plan with the IBM deal. Now NeXT needs a new partner, or else it can go it alone.

The choice of platforms is fairly limited. Since it needs to build an installed base quickly, NeXT can't wait for future systems to develop. It needs to look at hardware that is available today or in the near future. That includes Intel '486 and '586 PCs, SPARC systems, and Macintoshes.

The truth is that NeXT doesn't need a partner to get on one or more of these platforms. NeXTstep and Mach are portable enough that NeXT can produce versions for other computers, selling its OS as shrinkwrapped software. With NeXTstep's well-known advantages, plenty of customers will buy it as a replacement or complement for their computers' native operating systems.

Because each platform's microprocessor has its own instruction set, software developers will have to recompile their products for the different versions of NeXTstep – a headache for them, for resellers, and for users. But that will be true for Microsoft, Apple, IBM, and other OS vendors, too, since everybody will be doing portable operating systems.

Of the platforms mentioned above, the Intel and SPARC chips are used in systems that have open designs. Porting NeXTstep to run on other high-end PC clones or SPARCstations would not be difficult. The Mac would be more challenging, even though it uses the same chip as the NeXT, because it has a closed architecture with unpublished hardware interfaces. Still, NeXT's engineers should be able to manage it.

With NeXTstep running on any one or several of these platforms, developers would have added incentive to develop for it. There would be more customers for their products. Catch-22 would finally be history.

But there could be a new problem. Sales of NeXTstep for other platforms could eat into sales of NeXT's own computers. While becoming primarily a software company it might be a viable option, NeXT wants to keep selling hardware. To do that, NeXT has to keep its own hardware ahead of the current standards. NeXTstep on another platform should not be as good as NeXTstep on a NeXT computer.

Of course, NeXT will have to keep improving its price/performance and continue to add innovative hardware features to maintain its current technology lead. There it runs into another problem. The 680x0 architecture of the current NeXT machines may not have enough growth potential to keep up with the advancing chip architectures of other platforms.

So NeXT has a critical decision to make on which chip family to use in its next-generation systems. It can stick with Motorola, waiting on the '050 or moving to 88000 RISC architecture. It probably can't afford to wait for the new Motorola chip that's based on the IBM RS/6000. On the other hand, Intel's 80586 looks like it is on course for next year. SPARC is also an option, as are the MIPS R3000 and R4000 that will be used by Compaq, DEC, and others.

I don't know which chip NeXT should go with. It doesn't matter whether it is RISC or CISC, as long as it has high performance, rapid growth potential, and is available soon. But assuming NeXT chooses its hardware well, it should be able to maintain its technology lead over competitive systems. And if it combines an aggressive hardware strategy with a portable operating system, then it has a good chance to attain real critical mass by the time the earth stops rumbling.

* * *

All of that remains in the future. Now comes some nitty-gritty from the here and now.Last time, I gave my list of the Ten Most Wanted developments in NeXT technology and marketing. We received a strong response from readers, the most interesting of which are compiled in our Openers department.

But let's take another look at my list. Number 2, a database front end, is closest to being checked off [see "Covering the (Data) Bases" in this issue]. Lt. Sullivan has heard some interesting rumors about Number 6, a cheap color printer. There are also good signs on Numbers 1 and 3, page layout and CAD software. And Number 9, integrated communications, took a step forward with the Hayes ISDN modem.

Number 4, 3-D graphics and animation, has me baffled. Pixar keeps making news with RenderMan on other platforms, while NeXT seems like a poor cousin. Number 5, a color upgrade path, is still just a wish. If any of the speculation about non-68000 processors comes to pass, the question of upgrade paths is going to become much more complex.

The past three months have produced no major change in Number 7, a powerful marketing message, but I have confidence that NeXT's new marketing team is refining the positioning. There are no details to report yet on *NeXTWORLD* Expo, and there was no discernible change on Number 10, service and support.

Overall, there's movement. By next issue, we might be able to check some off. Then we'll add the most-named reader items, and keep a Billboard-style running tally. There are a few items from our earthquake scenario that could easily make Number 10 with a bullet. ◆

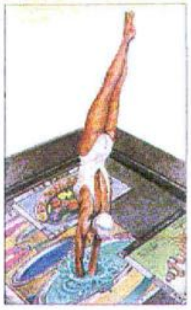
DAN RUBY *is the editorial director of* NeXTWORLD.

Step-by-Step: Plunging Into Color

by Paul Pruneau

The cover of the Fall 1991 issue of *NeXTWORLD* provided a dramatic example of the capabilities of NeXT's color systems. Here's the answer to numerous requests asking for details on how we did it.

① The idea for the cover was developed at a creative concept meeting among Dan Ruby, the editorial director of *NeXTWORLD*, and Tom Suiter and myself, members of the design firm CKS Partners.



We wanted to communicate that the NeXT was making a big splash in the realm of color technology. Creating the sketch was easy – we only needed markers. Creating the final image would require several photo shoots and hours of electronic photo manipulation by someone skilled both with the NeXT and in illustration. Luckily, Keith Ohlfs, NeXT's illustrator/programming-genius-in-residence offered to help.

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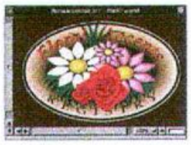
② To create the first image on the NeXT's screen, San Francisco photographer Paul Matsuda assembled and shot a custom palette of the paint cans our model would dive into. Ohlfs then scanned a transparency of the image into a NeXTdimension with 64MB of RAM. Ohlfs corrected the colors of the image with custom image-editing software.

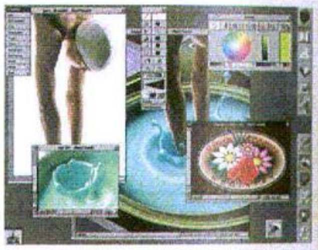
③ The other images on the NeXT screen were created with the NeXT version of Adobe Illustrator. The idea was to show off some of the applications for the new color systems and the new Illustrator program. We saved the images as EPS files, then sheared and rotated them into the perspective that would match the layout.



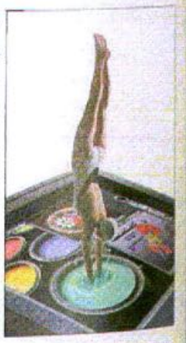
④ CKS Partners held a casting session to find a diver who had the right proportions for the redesigned magazine cover. We cheated a bit here. The diver wasn't really diving. Instead, she was suspended from a pull-up bar in the photo studio. This photo, too, was scanned into the NeXTdimension.

⑤ The paint splash was a particular challenge. It had to look convincingly like the kind of splash that would be made in a paint can by a diver, and also be of a proportion, scale, and shape that could be integrated into the assembled image. We took dozens of photographs of splashes and scanned the best ones.

⑥ With all the component images scanned in, the real work began. Using his custom image-editing program and a template made from the original sketch, Ohlfs selected, enhanced, color-corrected, and composed each element according to the layout. The NeXT's unique alpha channel made it possible to create subtle blends and transparent overlays as the individual images were assembled and adjusted. The speed of the NeXT's color display made it possible to try different effects as the image came together.



⑦ Ohlfs saved the final composed image to optical disk as a 16MB encapsulated PostScript file, which we sent to a NeXT-equipped service bureau for output as film.



PAUL PRUNEAU *is the creative director at CKS Partners, the design firm responsible for the redesign of* NeXTWORLD.

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The New NeXTWORLD

I love the new issue. I' ve been reading it for hours and am still finding hidden gems in the folds of its pages. It's worth waiting a quarter if this is what we'll get.
ERIC CELESTE
Cambridge, Massachusetts

This issue is different. There is actually useful information in it that I hadn't already heard about from other sources. I'm impressed.
LOUIS A. MAMAKOS
College Park, Maryland

Well, you're a real computer magazine now: You've got cheesecake on the cover.
ANGUS MACDONALD
Concord, California

I knew that changes were in store, and had expected improvement, but my expectations were exceeded. The only thing I miss is Dock Soup.
M. CARLING
Palo Alto, California

Shallowness and trendy design have prevailed. Banal and predicatable thinking has replaced a groundbreaking publication with the same old hackneyed formula.

Please cancel my subscription.
CORY MAYLETT
Salt Lake City, Utah

Issue 3 represents an improvement of several orders of magnitude over the previous two. I would, however, nudge its balance a bit towards the technical side.
ANTHONY M. ROTH
Cambridge, Massachusetts

More Most Wanted

enjoyed your comments on what NeXT needs to do ["Ten Most Wanted," The NeXT World, Fall 1991]. I agree with all of them except number 2, "A full-featured, programmable database front end." First, there has to be a decent DBMS at an affordable price.

What NeXT needs to do (and quickly) is build its own DBMS. Nothing fancy, just some back-end capability that can be called from Objective C programs. This would give developers a complete development environment and shield them from compatibility problems between a third-party DBMS and NeXT. How do you explain to your clients they can't have 2.0 because Sybase isn't ready?

With the back end provided by NeXT, you would see a host of front ends for end users from third-party vendors.
JIM ENGEL
Burlingame, CA

See the article "Covering the (Data) Bases" in our Special Report in this issue for a rundown on NeXT's database support plans. – NW

I would have put number 10 first. The computer industry has been terrible as it applies to customer service, and customer service is especially important with such a versatile (complicated) product.
CHRIS CUILLA
President, The Cuilla Company
Grayslake, Illinois

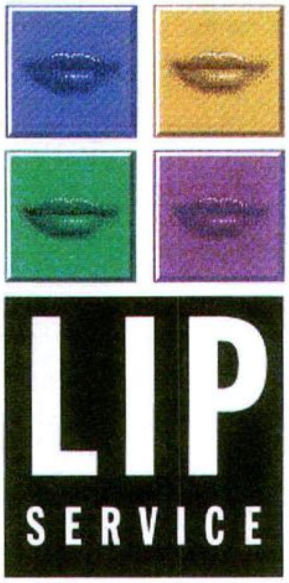
Because our "Ten Most Wanted" list drew so many interesting responses, we decided to make a regular space for readers' suggestions to NeXT. Look in our Openers department under "Most Wanted" for the most provocative suggestions we receive. – NW

All Thumbs

I really appreciated your [Barlow & Lavin] review column in the Fall 1991 *NeXTWORLD*. The "Siskel & Ebert" style was most effective, but your single "thumbs up" or "thumbs down" rating system is perhaps too simplistic. You recognized this yourself when you had to split the NeXT Support review into two ratings.

The thumbs down rating for FrameMaker led me to assume it was a "bad" package. On reading the text, I found that it served my exact needs (my bioengineering thesis – lots of formulas, rigid format, many chapters long).

Perhaps in the future you could put multiple thumbs for different user requirements, e.g., graphic artists: thumbs down; technical publishers: thumbs up.
JOHN VAN HETEREN
Berkeley, CA
vanhet@garnet.berkeley.edu



Globe Trotting

The focus of the magazine seems to be on events and news in the United States. It focuses on American products, American developers, and the American NeXT community.

At NeXT we anticipate that our sales in Europe will be about 30 percent of NeXT's worldwide sales during 1991. We are really pushing all of our developers to localize their products. Perhaps *NeXTWORLD* should also follow suit, and localize its product as well.
MARY MCNABB
NeXT technical support

We agree. In this issue, see our feature "NeXT Goes Global," for a primer on NeXT's overseas policies and the first reports from some of our overseas correspondents. In the future, overseas news will have its own space in the Field Reports section of our Community department. We'll also be expanding our overseas distribution, with copies on newssstands and at NeXT dealerships in Europe and Asia. – NW

Not so Fast, Guy

In "Deja Vu" [Vanishing Point, Fall 1991], Guy Kawasaki said, "If NeXT defined a market for professional workstations with black cases, they could claim 100 percent market share." Not true.

The first black workstaton to actually ship was a Mac II that I painted back in 1988. To date, NeXT has probably only shipped around 99.8 percent of all black workstations. Since I don't paint Macintoshes any more, and nobody wants his NeXTstation painted beige, NeXT's market share will probably continue to increase.

Guy, you should know better than to wear denim shirts with buttondown collars, and you certainly should be aware of the black Macintosh phenomenon. After all, you've got one sitting on your desk. I should know. I painted it.
DAVID SIEGEL
Palo Alto, California

Corrections

In *NeXTWORLD Extra* (September 1991), Marble Associates' Teleconnect was confused with Decision Builder, an entirely separate product. Decision Builder is a toolkit for building decision support and is not yet shipping.

Street Prices (Fall 1991) mistakenly listed Diagram! 2.0. The current shipping version of Diagram! is 1.1.

***NeXTWORLD* welcomes your comments. Please send them to Letters at NeXTWORLD, 501 Second St., San Francisco, CA 94107, or e-mail letters@nextworld.com.**

Adobe Illustrator® has already proven its talents on hundreds of thousands of desktops the world over. Now Adobe unleashes its power in the industry's richest graphical environment: Presenting Adobe Illustrator for NeXT™ computers.

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And with the NeXT version of Adobe Illustrator, preview mode is not strictly for looking. You can actually edit your work there, saving even more time.

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The result is a complete design package, with a full selection of high-end tools for creating both graphics and text.

In all modesty, we'd have to say there's never been a program that can take you from concept to final color separation with this kind of speed and confidence.

But then, who better to create the most advanced program for the pure PostScript® world of NeXT, than the company that created PostScript in the first place.

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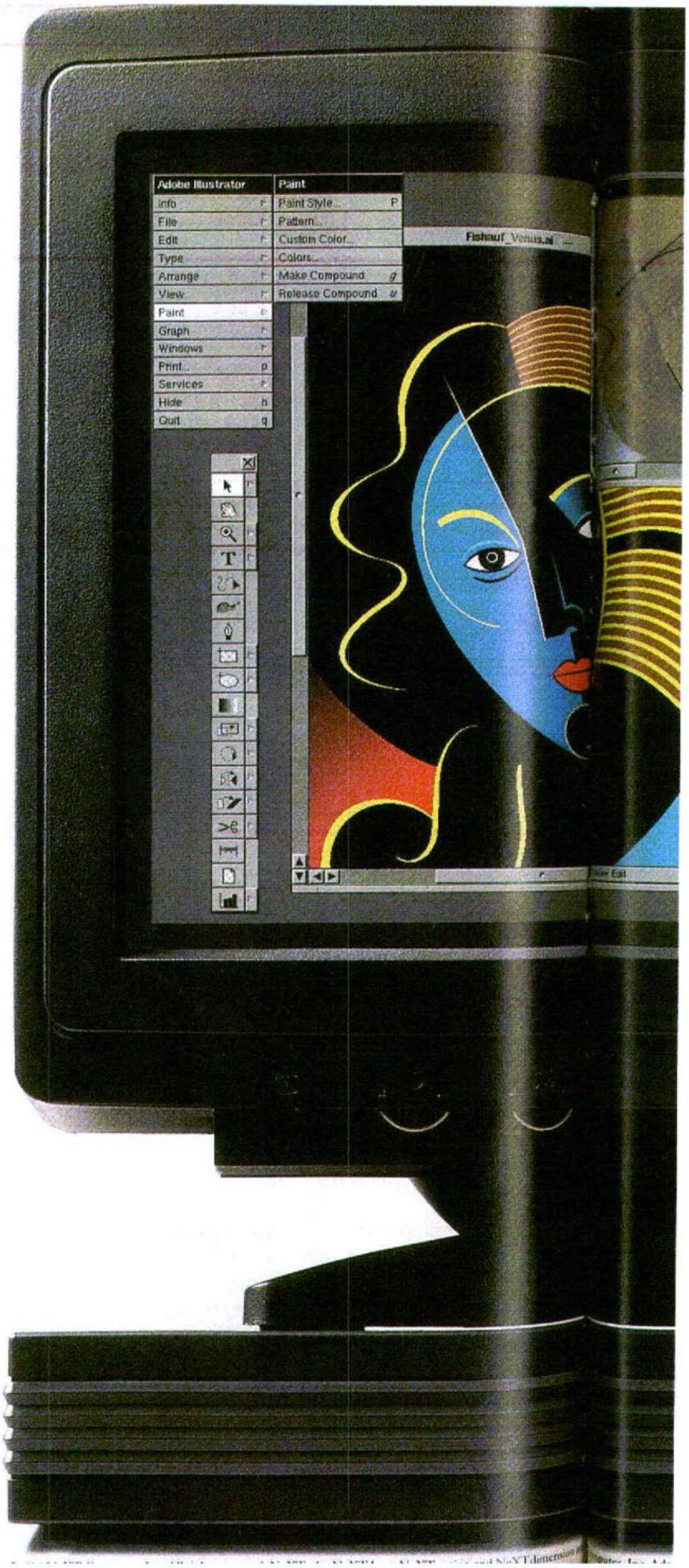
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And because it's a genuine multitasking machine, a NeXT computer allows you to have all your applications open and linked without any performance degradation.

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For your free copy of our NeXTstation brochure, call us at 1-800-848-NeXT. You'll discover that in the world of NeXT, software is more than powerful. It can be positively eye-opening.

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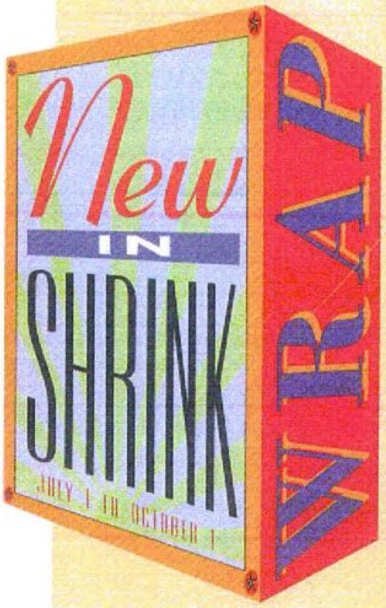
> NeXT, with widening support from computer buyers, is making a surprising comeback – just as industry events may undermine progress. [NeXT's quarterly results] put it on target to achieve $200 million in 1991 sales. "This is a very respectable accomplishment," said Richard Shaffer, editor of Computer Letter. "Steve is beginning to gain credibility."
>
> – *G. Pascal Zachary*, Wall Street Journal, *June 27, 1991*



DTP/Graphics

Adobe Type Sets (I, II, III)
Adobe Systems
PostScript fonts for the NeXT.
$99 (I), $99 (II), $198 (III)

Adobe TouchType 2.1
Adobe Systems
Updated version of popular type-manipulation program.
$249

Diagram! 1.1
Lighthouse Design
New version of simple chart and diagram software.
$399

Database

Oracle RDBMS 6.0.30
Oracle Corporation
Relational database.
For price, contact Oracle

Oracle Financials
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Financial applications for bookkeeping.
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Oracle Government Financials
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RDBMS with built-in 4th-generation language.
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Connectivity/Communications

Hayes ISDN System Adapter
Hayes Microcomputer Products
ISDN terminal adapter with serial output.
$1599

co-Xist 2.1.1
Pencom
Newest release of X Windows X11R4 server now supporting color.
$249

Business

OnDuty
Digital Instrumentation Technology
Personal Information Manager.
$345

SAS System
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Data access, management, analysis, and presentation.
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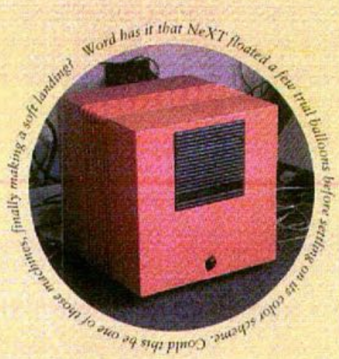
Objective Technologies
Developer tool that links Improv to Sybase.
For price, contact Objective Technologies

Peripherals

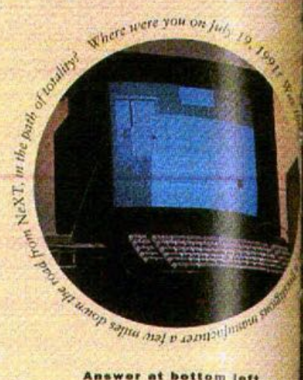
Color Digital Eye
Metaresearch
Digital Eye with color support.
$1195

For information on these products, contact your NeXT product dealer. Manufacturers: If you have a product shipping for the NeXT, please write us at *NeXTWORLD*, New Products, 501 Second St., San Francisco, CA 94107, fax 415/978-3196, or send e-mail to newprod@nextworld.com.

MYSTERY PHOTOS

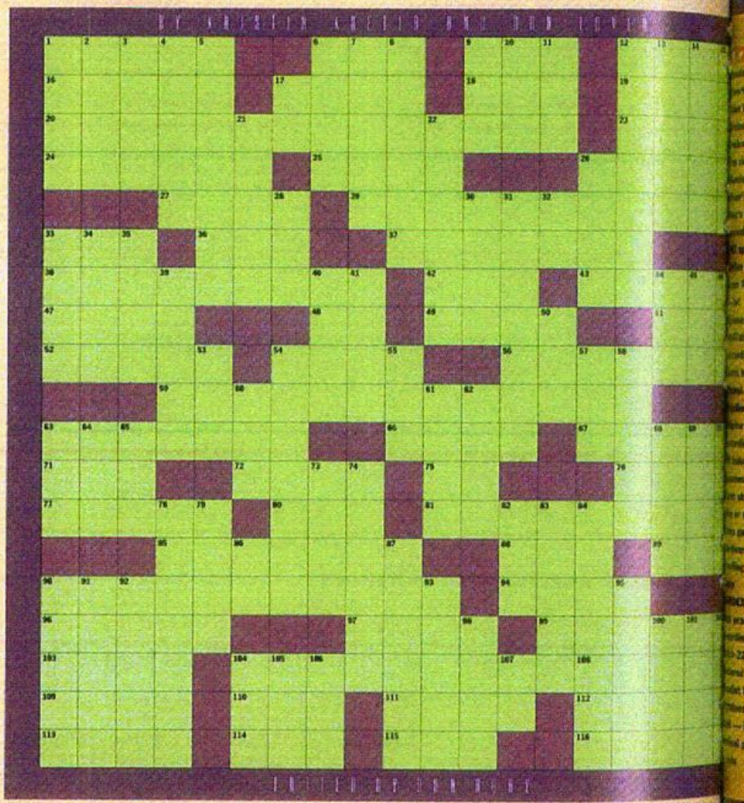


Word has it that NeXT floated a few trial balloons before settling on its color scheme. Could this be one of those machines, finally making a soft landing?



Where were you on July 19, 1991? Was … *manufacturer a few miles down the road from NeXT, in the path of totality?*

Answer at bottom left.



MOST WANTED

Judging by responses to the Ten Most Wanted list in Dan Ruby's column in our last issue, readers have a lot to say about what they want in their NeXT systems. We've reprinted some of the most interesting ideas here. In the next issue, we'll debut a ranked listing, then keep a running tally of the ten most wanted features. To add your vote, write to Ten Most Wanted, NeXTWORLD, 501 Second St., San Francisco, CA 94107; or e-mail nextworld@nextworld.com.

- **A bubble-jet printer similar to Apple's StyleWriter, costing about 10 to 15 percent of an entry-level slab.**

M. Carling, Palo Alto, California

- **Distribution of Extended OS on CD-ROM so users have a way to recover from corrupt file system problems.**
- **A very low cost, entry-level system, perhaps best achieved by removing the internal hard drive and floppy from the Station and offering an expansion box for peripherals.**
- **A port to the Intel '486/XVGA environment. NeXT should get out of the hardware business and sell NeXTstep.**
- **A 900 number for support for those of us who don't need several thousand dollars worth of support, but are willing to pay as we go.**

Charles Lloyd, Stanford, California

- **Direct system support for reading/writing Macintosh disks.**
- **A NeXT vs. everyone else ad campaign. We know the NeXT is the greatest thing since squeezable relish jars, but the rest of the world is missing the show.**
- **A NeXT-specific voice-command product similar to Voice Navigator for the Macintosh.**

Chris Cuilla, Grayslake, Illinois

- **Free NeXTstep. History shows that it just won't spread far unless it is made freely available for a variety of platforms. And NeXT will benefit by expanding and solidifying its market.**
- **A SCSI optical drive compatible with the original OD,** … **can be used as a peripheral to a NeXTStation.**
- **A 25MB floppy drive as standard. This would allow NeXT to distribute the entire OS on floppies (a minimal OS would** … **on a single floppy, and that would be enough for it to bootstrap to the full 200MB Extended Release).**
- **Lower prices on NeXT memory, which is currently outrageously priced at four to five times the market rate.**

Dr. Barry Merriman, Los Angeles

- **Better icon and screen management capabilities to permit selective grouping and hiding of icons generated by different projects using the same icons.**
- **Multiuser project management.**

Greg Shannon, Bloomington, Indiana

MYSTERY PHOTOS

Oh, those wild and crazy hackers from the Media Lab. The pink Cube is the result of a prank played on Pascal Chesnais, moderator of comp.sys.next.announce. The black Sun belongs to Mike Hawley, author of the original Digital Librarian, who wanted it to match his Cube.

> If you had labeled Steven P. Jobs a has-been, get your eraser ready. The co-founder of Apple Computer, who has been trying for six years for another hit at his new firm, NeXT, finally had good news Wednesday. NeXT's second-quarter revenue hit $46 million, up 86% from the first quarter.
>
> – *Kathy Rebello*, USA Today, *August 1, 1991*

It seems that Mr. Jobs's eternal search for perfection is often his worst enemy. He has gone out of his way to discourage software developers from just copying their existing programs to his computer – instead holding out for first-time original creations.

– John Markoff, The Executive Computer, New York Times, *August 11, 1991*

STREET PRICES

ware Product	Best price	Where
ation C for hard drive, RAM)	$7995	NeXT or any dealer
ansion board RAM)	$3995	NeXT or any dealer
[illegible]	$37	Chip Merchant, 800/426-6375
[illegible]	$145	Chip Merchant, 800/426-6375
floppies	$12.95/10	Fry's Electronics, 408/733-1770
floppies	$72.95/10	Fry's Electronics, 408/733-1770
hard disk	$1413	Fast Access, 708/530-7749
hard disk	$2086	Aurora Industries, 800/426-1591

Software Product	List	Street
WordPerfect 1.0.1 (WordPerfect)	$495	$329
Diagram! 2.0 (Lighthouse Design)	$499	$339
TextArt 1.0 (Stone Design)	$375	$319
Improv 1.0 (Lotus Development)	$695	$549
Illustrator (Adobe Systems)	$699	$459
SoftPC (Insignia Solutions)	$499	$329

These are the best prices we could find, as of press time, on in-demand NeXT products. You should be able to match the price with a little shopping.

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specialty
color (2 words)
Korbut
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ng to Steve
ed (abbr.)
sourcebook
archangel
technology,
ng to Steve
rialist (1784-1864)
alphabet
fracture
ice preceder
supplier (abbr.)
ng to Steve
Vaughan
— is a byte

77. English physicist (b. 1902)
80. No. 2 exec.
81. Easy decision, according to Steve
85. "I can see — . . ."
88. Moray
89. Dear old ____
90. NeXT software versions, according to Steve
94. Chasm
96. Label company
97. Spider crab
99. Comfort
103. Storefront sign
104. Purpose of computers, according to Steve
108. — of March
109. Stallman's org.
110. School or collar
111. Goad (2 words)
112. Dirty pool
113. 256MB platters (abbr.)
114. British topology org.
115. DOD computer buyer

Down

1. River craft
2. Sufficient (obs.)
3. Razor brand
4. Fertilization option: in —
5. Level of command
6. Bard
7. Foot salts
8. Seabird
9. Brit. fliers
10. Free software company
11. Mass. user group
12. Coffee island
13. Spokeswoman Bryant
14. Alain ____, high-tech realtor
15. Mixes
17. Corp. communications
21. Hemmed
22. Forward surge
26. Spock's journey
28. Fruit drink
30. Imitate
31. President Fillmore
32. Belonging to
33. Israel's Eban
34. Humdrum
35. Card game
39. Gandhi's homeland
40. Unknown author (abbr.)
41. Lavish attention upon
44. Sequitur prefix
45. Fast plane
46. Socialite Hogg
53. Finale
54. Yellow vehicle
55. Building wings
57. Spanish article
58. Pong producer
60. Weep
61. Story or thread
62. Italian given name
63. Claudius's foot
64. Pierre's friend
65. Capek novel
68. Ayn or Paul
69. Length x width
70. Disk or currency
73. Unit of pressure
74. Serious
78. Thespian
79. Overdo
82. Beseech
83. Employ again
84. Permitted
86. D – G connection
87. Mach 1 pilot
90. Dartmouth language
91. Elude
92. Raqueteer Monica ____
93. Weight-loss programs
95. Don't — dead horse (2 words)
98. Unit of matter
100. Charlie Brown's cry
101. Hoof-on-pavement sound
102. Poet St. Vincent Millay
104. Top money exec.
105. Scanner co.
106. Student exchange prog.
107. Brit. admiral (1758-1805)

Solution on page 48.

Art Imitates Life

If Kitty Kelly had written about the icons of the personal computer industry, she couldn't have gotten much more personal. But in Silicon Dreams (Knightsbridge Publishing, $19.95), a forthcoming novel by Joe Hutsko, who is a former employee of Apple and NeXT, the names have been changed to protect the innocent. The book was produced entirely on NeXT systems (see "Instant Books" in the Community section of this issue).

Cast of characters

Scott Jones, the mercurial genius who invented the world's first personal computer company, Approach Computer.

David Sullivan, quintessential company man and beverage marketing genius, who has a secret plan to save Approach.

Swoozy Sullivan, former hand model who parts with more than a career when she becomes Mrs. David Sullivan.

William Harrell, chairman and CEO of the world's largest computer company – International Computer Products (ICP).

Ivy Green, brilliant and beautiful, whose new idea is the spark for Jones's next-generation system.

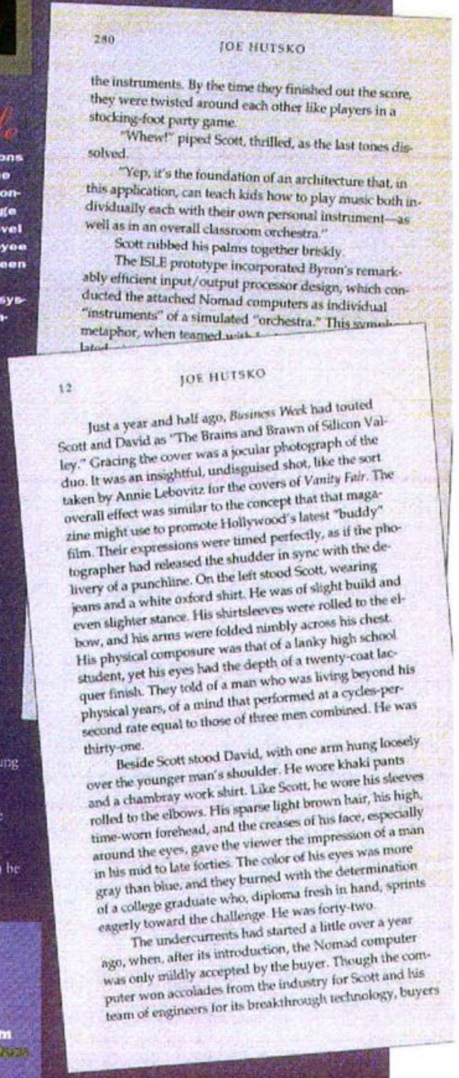
Kate McGreggor, Jones's '60s folk-rock girlfriend, proves to be both loyal soul mate and mother of invention.

Hank Towers, co-founder of Approach, financed the company after meeting Jones at a high school science fair.

Byron Holmes, retired ICP heir who feels young again after meeting the reclusive Jones at his Maine vacation home.

Laurence Maupin, David Sullivan's attractive press assistant, who has schemes of her own.

Jean-Pierre Poitras, polo player and horse trainer, who shows that corporate politics can be less complex than affairs of the heart.



280 JOE HUTSKO

the instruments. By the time they finished out the score, they were twisted around each other like players in a stocking-foot party game.

"Whew!" piped Scott, thrilled, as the last tones dissolved.

"Yep, it's the foundation of an architecture that, in this application, can teach kids how to play music both individually each with their own personal instrument—as well as in an overall classroom orchestra."

Scott rubbed his palms together briskly.

The ISLE prototype incorporated Byron's remarkably efficient input/output processor design, which conducted the attached Nomad computers as individual "instruments" of a simulated "orchestra." This symbol- metaphor, when teamed

12 JOE HUTSKO

Just a year and half ago, *Business Week* had touted Scott and David as "The Brains and Brawn of Silicon Valley." Gracing the cover was a jocular photograph of the duo. It was an insightful, undisguised shot, like the sort taken by Annie Lebovitz for the covers of *Vanity Fair*. The overall effect was similar to the concept that that magazine might use to promote Hollywood's latest "buddy" film. Their expressions were timed perfectly, as if the photographer had released the shudder in sync with the delivery of a punchline. On the left stood Scott, wearing jeans and a white oxford shirt. He was of slight build and even slighter stance. His shirtsleeves were rolled to the elbow, and his arms were folded nimbly across his chest. His physical composure was that of a lanky high school student, yet his eyes had the depth of a twenty-coat lacquer finish. They told of a man who was living beyond his physical years, of a mind that performed at a cycles-per-second rate equal to those of three men combined. He was thirty-one.

Beside Scott stood David, with one arm hung loosely over the younger man's shoulder. He wore khaki pants and a chambray work shirt. Like Scott, he wore his sleeves rolled to the elbows. His sparse light brown hair, his high, time-worn forehead, and the creases of his face, especially around the eyes, gave the viewer the impression of a man in his mid to late forties. The color of his eyes was more gray than blue, and they burned with the determination of a college graduate who, diploma fresh in hand, sprints eagerly toward the challenge. He was forty-two.

The undercurrents had started a little over a year ago, when, after its introduction, the Nomad computer was only mildly accepted by the buyer. Though the computer won accolades from the industry for Scott and his team of engineers for its breakthrough technology, buyers

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HARDWARE

1. **Canon Double-Sided Optical Disk** – Canon USA
2. **PLI SuperFloppy 2.8 Floppy Drive** – Peripheral Land
3. **Interfax 24/96 NX Fax/Modem** – Abaton Technology
4. **CubeFloppy 2.9 Floppy Drive** – Digital Instrumentation Technology
5. **DoveFax Fax/Modem** – Dove Computer

SOFTWARE

1. **WordPerfect 1.0.1** – WordPerfect Corporation
2. **Adobe Type Library** – Adobe Systems
3. **Diagram! 1.1** – Lighthouse Design
4. **SoftPC 2.0** – Insignia Solutions
5. **FloppyWorks 2.2** – Digital Instrumentation Technology

Vendor reports always outstrip analysts' numbers. Come to IDC's library and try to find a vendor and a report concurring on anything. The word "press release" comes from the Latin "to exaggerate one's unit shipments." Strip away Jobs's marketing stumbles and lack of profits, and you have one of the most inventive boxes since the Macintosh.

– David Arlas, Senior Analyst, International Data Corporation, in a letter to Forbes, *June 24, 1991*

Instant Books

Only a few weeks remained before the Senate vote on whether to use military force in the Persian Gulf. Gerry Sindell, president of Knightsbridge Publishing, received a series of interviews from a woman who had lived in the Middle East. The author was unproven, the subject explosive: atrocities committed by Saddam Hussein's army against Kuwaiti citizens.

To have a chance of making it big, the book would have to be out in weeks rather than months, the usual time frame for mass-market book production. That would mean doing much of the work in-house, and the in-house computer system was a newly installed NeXT network that was as unproven as the book's author.

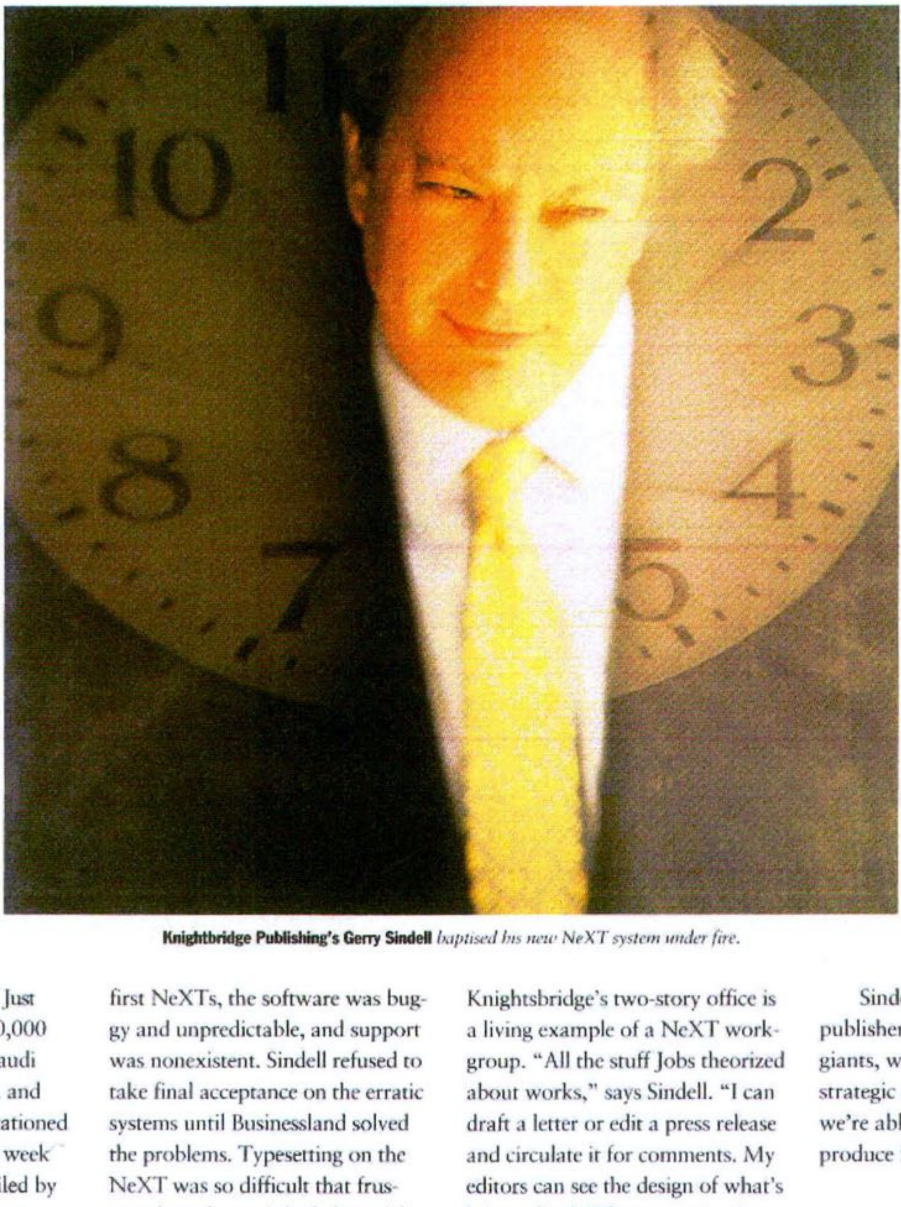
It worked. Just one month after the manuscript arrived at Knightsbridge's Los Angeles office, the book had been edited, laid out in FrameMaker, printed in-house on a NeXT laser printer, and photographed for traditional mass-market printing. Just after New Year's Day, 300,000 books were loaded onto Saudi planes and shipped to U.S. and allied military personnel stationed in the Gulf. The following week another 700,000 were mailed by second-day air service to newsstands, supermarkets, and airports throughout the United States. Sindell, a former screenwriter, had directed a publishing thriller. Featured on "Good Morning America," *The Rape of Kuwait* was an instant bestseller, a seemingly smooth story of NeXT's transition into another new arena.

But in the spring of 1990, when Knightsbridge received its first NeXTs, the software was buggy and unpredictable, and support was nonexistent. Sindell refused to take final acceptance on the erratic systems until Businessland solved the problems. Typesetting on the NeXT was so difficult that frustrated employees joked about "the rape of Knightsbridge."

Sindell, however, was determined. Early this year, he came back for more, taking delivery on 15 new machines from NeXT. This time he had help from a VAR experienced in publishing, as well as assistance from NeXT (including former NeXT employee Joe Hutsko, whose novel, *Silicon Dreams,* is being published this fall by Knightsbridge).

Crowded with empty NeXT boxes and piles of books, jacket covers, and manuscripts, bustling Knightsbridge's two-story office is a living example of a NeXT workgroup. "All the stuff Jobs theorized about works," says Sindell. "I can draft a letter or edit a press release and circulate it for comments. My editors can see the design of what's being edited. When we write the flap copy we know how it looks. It works. It's the workgroup."

As Sindell speaks, Elizabeth Haynes is answering the phones and distributing faxes over the network from agents and lawyers. Joseph Blaustein, the system administrator, gets a request from the art department to change a detail on an upcoming cover. He pulls up the cover of *Anchors*, a book on Tom Brokaw, Peter Jennings, and Dan Rather, changes a code that appears on the jacket, and prints it out for the art department.



Knightbridge Publishing's Gerry Sindell *baptised his new NeXT system under fire.*

Meanwhile, Kimberly Sindell is pulling together a list of key data for the weekly management meeting. Sales, returns, submissions, rejections, and reprints are tracked in Improv. "It lets us know how the company is doing on a weekly basis," she says. Upstairs, Jim Morris, executive editor, props his feet up alongside a NeXT sandwiched between proposals, manuscripts, and books. He's only had his machine a few days, but yesterday he sent his first NeXT fax.

The big guns in the publishing world are watching upstart Knightsbridge's high-tech experiment. "My feeling is we're going to be the first great trade publisher of the 21st century," says Morris, motioning to the pile of books and manuscripts that engulf him.

Sindell adds: "As a small publisher competing against the giants, we're always looking for a strategic advantage. With NeXT, we're able to move faster and produce faster." ◆

by JONATHAN LITTMAN

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Y STUART WATSON

Living Color

When six college classmates become inspired by Steve Jobs's visions and then find two years after graduation that their professional jobs are unsatisfying, the obvious solution is to share a house and a NeXT software development business.

That was the case for the partners of Lighthouse Design, producers of the Diagram! software tool, who, while attending Carnegie Mellon University, heard Jobs speak there in 1985. "His point was that when you're young and already in debt from attending college, that might be the only chance you're ever going to have for something as radical as starting your own company," explained Roger Rosner, leader of the engineering efforts for an upcoming Lighthouse product.

The six 25-year-old entrepreneurs weren't concerned by their lack of business experience. "We had the sense we could handle 90 percent of whatever was necessary to create a successful business. On the other 10 percent, we knew we'd have a baptism-by-fire," says Jonathan Schwartz, Lighthouse's leader of marketing.

They set up shop in a comfortable, older house in a wooded section of Chevy Chase, Maryland, just outside Washington D.C., which serves as both office and home for the young men. "Most people like to separate their work lives from their personal lives," said Rosner. "We like being at it full time, as in 24 hours a day."

After a few false starts on a CAD product, the team finally found their stride and market with the development of Diagram! – originally known as BLT, for Box and Line Tool.

Diagram! provides not only traditional illustration capabilities (including gridding, grouping, zooming, layering, and alignment features), it "offers a fundamentally different way of looking at productivity and presentation," according to Schwartz. Drawing innovations include customizable symbol palettes and direct manipulation of graphics in any view or magnification.

Diagram! also provides intelligent drawing in the form of rubber-banding (on-screen lines →

Kevin Steele, Ray Ryan, Roger Rosner, Rob Kedoin, Alan Chung, Jonathan Schwartz *of Lighthouse Design decided to risk their fortunes before they had anything to lose.*

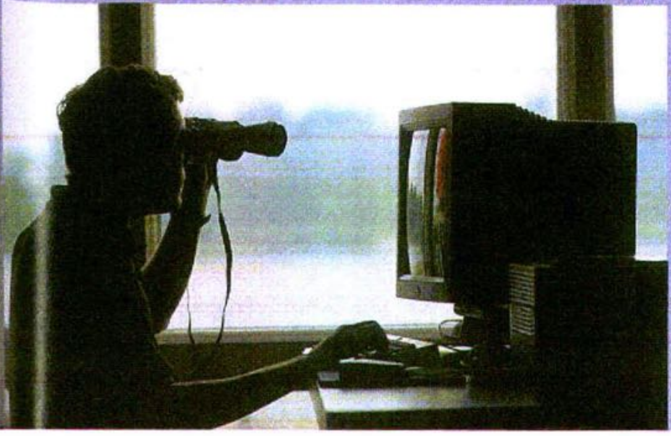
Different Strokes

"Stroke, stroke, stroke." The traditional call of the coxswain punctuates the chill morning air at a sculling regatta in Princeton, New Jersey. Far less traditional, though, is the NeXT computer set up on the riverbank to manage the heats and record the competitors' times.

But the NeXT system may help the United States Rowing Association (USRA) National Team boost its performance in next year's Olympics, says Geoffrey Knauth, a cox himself and a member of the Boston Computer Society NeXT Group.

"I'm used to taking abuse from coaches and athletes whenever I use computers to process results at athletic events," says Knauth. "But it didn't happen this time. Usually the computer program takes too long, getting the information to the coaches too late to help them decide which rowers belong in which categories." The NeXT's real-time multitasking, coupled with the flexibility of Lotus Improv, solved the problem.

Geoffrey Knauth *monitors U.S. rowing team time trials in real time from a NeXT.*



Knauth's system got its first trial at the National Team's scrimmages in Princeton last April. Knauth set up his computer on the riverbank in Mercer County State Park and in 15 minutes developed his Improv model for processing the competitors' times. His spreadsheet accounted for the entrant's name, rowing class, heat and lane number, race distance, times, and finishing position.

Now the USRA is evaluating the NeXT for use in all future events, including more-advanced applications. Before each race, Knauth uses the NeXT to help prepare himself and his team. The "stroke" call must be precise. Since races of more than a mile are often decided by a boat length or less, the precise cadences used during the race are critical. Tools developed with the NeXT's Sound and Music Kits help racers visualize the race's speed, rhythm, milestones, and tactical moves.

In the future, Knauth hopes to use a NeXTdimension for detailed video analysis and catalogs of individual rowers' techniques. How much this contributes to the success of the team will become clear at the Olympics next summer in Barcelona, Spain. ◆

by DAN LAVIN

→ **Living Color**

can represent connections and relationships to be retained when an object is moved or to be remembered when an item is deleted), smart labels that also move with their links, and Undo for the last change made to every object, not just a single one.

The reaction to their product, which shipped in January, has been very satisfying, says Schwartz. "When we demonstrate it, people usually buy a copy for every machine they own."

In contrast to the current trend by large developers of porting their software to several platforms, Schwartz said that his collaborators wanted to develop a product "to engage the NeXT, to take advantage of its unique features in ways that couldn't be implemented on other machines."

Lighthouse created a hierarchy of responsibilities to meet this development challenge, after first experimenting with other styles. "Consensus is a nice idea, but leads to 17-hour meetings," explained Schwartz. "Democracy is nice, too, but leads to 10-hour meetings. We needed some sense of organization. We held the naive assumption that if there was work to do, someone would pick it up and it would get done."

Now, team members rotate through various roles, assuming responsibility for specific portions of their business and engineering activities. While other developers they know have taken up to three years to begin beta testing, Lighthouse members report developing Diagram! in nine months, in what they call their "just-in-time" management style.

"It's going orders of magnitude more smoothly than before," said Schwartz. "There are way fewer fires to put out now."

by STUART SILVERSTONE

Mach's Main Man

When NeXT picked the Mach operating system he had helped develop at Carnegie Mellon University (CMU), Avie Tevanian wasn't ready to let it go.

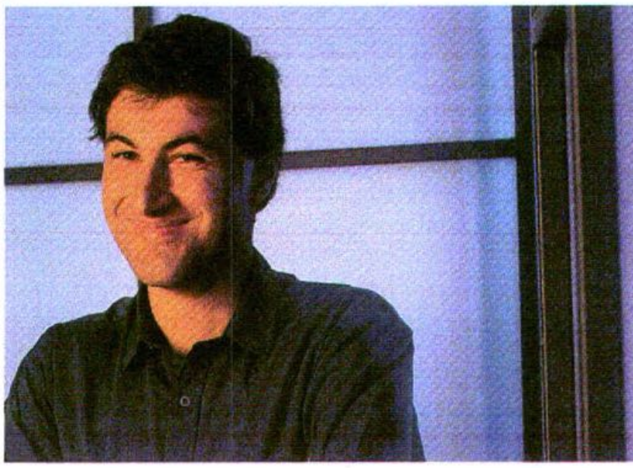
"I figured there was this potential for a big downside," recalls Tevanian. "I was afraid that they were going to take it, misunderstand it, ruin it, and ship it," he remembers.

For the previous three years, Mach, a variant of the UNIX operating system, had been Tevanian's life. Originally called SOS, the Supercomputer Operating System, it was created for use in a secret multiprocessor supercomputer under development by Digital Equipment Corporation. The operating system was designed to coordinate the entire computer's activities, allowing different programs running on different parts of the supercomputer to communicate with one another rapidly and efficiently.

Although Digital eventually canceled the supercomputer project, the CMU group kept working. Its operating system seemed to mesh perfectly with the new generation of high-powered workstations that were just beginning to hit the market in the mid-1980s.

Steve Jobs discovered Mach in the fall of 1985. NeXT's founders were visiting universities around the country, looking for interesting technology. "They knew that UNIX was important to have," remembers Tevanian. Mach was UNIX – and more. "It was more future-thinking. It was designed with goals that were similar to NeXT's goals: networked workstations, as opposed to a monolithic time-sharing environment."

A year later, while at dinner with Tevanian and Tevanian's CMU doctoral advisor, Rick Rashid, Jobs told them that NeXT had decided to use Mach. "We're betting our company on you guys," Tevanian recalls him saying.



Avie Tevanian *helped create Mach at CMU, now manages it at NeXT.*

Jobs hoped Mach would be a magnet for NeXT. Says Tevanian, "They thought that bringing interesting technology into NeXT was a good way to bring good people into NeXT. Nobody wants to do a [UNIX] System V port."

Well, it brought in Avie, as he likes to be called. After receiving his doctorate from Carnegie Mellon, he took the job at NeXT as the company's director of system software.

When Tevanian arrived in California, things were off to an uneven start. "They had early prototypes that only half worked," he recalls. Some of the computers wouldn't even boot. On the other hand, John Seamons and Mike Demoney had already ported the Mach operating system to the new computer. Tevanian set about fixing the bugs that were still in the Mach kernel, tuning Mach to the NeXT hardware, and planning the direction in which the operating system needed to grow.

Tevanian's office, on the second floor of NeXT's secretive Building Two, is a crowded testimony to his four years at NeXT. The shelves are overflowing with technical proceedings from Usenix conferences, NeXT documentation, books that people have given him (and that he hasn't had time to read), and folders too important to file. In a corner of the office, in its original plastic cover, is his computer science doctorate from CMU.

These days, Tevanian supervises a staff of 15 people who work on the Mach kernel, as well as all aspects of NeXT networking, connectivity, system administration tools, and multiple-file system support. Tevanian decides which features from CMU get put into the NeXT kernel – and which will be held until they have a better or more stable implementation.

Has Tevanian ever looked back? Well, his other job offer when he graduated from CMU was to work at Microsoft Corporation on OS/2. He admits that once in awhile he has a twinge of regret when he looks at the *Wall Street Journal* and computes the value of the stock options that Bill Gates had promised him.

by SIMSON L. GARFINKEL

Field Reports

Hot topics and goings-on in the NeXT user community

Threads from the Net

Reading the news. NeXT developer Glenn Reid began what is certainly the longest thread in comp.sys.next history. It included a long string of characters that could be interpreted by a new NeXTmail-like NewsGrazer as an image. The excited discussion of on-line multimedia news quickly mushroomed into a debate about multimedia standards and historical precursors. Then it degenerated into flames about large message attachments and appropriate net etiquette. One exciting scheme mentioned, the Profile Design Project, is a non-profit, long-term project to produce, distribute widely, and study the uses of a sophisticated multimedia on-line magazine that could potentially be read by millions.

*

ND limitation. Some new NeXTdimension owners were disappointed that the on-board i860 graphics processor is accessible only through PostScript. They noted that NeXT's quoted 3-D graphics benchmarks are meaningless with this limitation. Are real-time video and interactive RenderMan only a dream?

*

Rumors fly. Readers wondered if there was substance to rumors of a NeXT 88100-based system, capable of 40 to 50 MIPS. Using this chip, coupled with the new, faster DSP 96002, NeXTdimension performance would almost double. Some posters affirmed the story, citing unnamed sources at NeXT. Others chimed in with additional rumors of NeXTs running on MIPS chips and of NeXTstep running on HP workstations.

*

Sez who? A spirited discussion raged for a short time after a prankster uploaded a fake *Wall Street Journal* article reporting that Sun and NeXT had allied forces to combat Apple-IBM and ACE. Supposedly, the two companies were to work together on object-oriented programming and RISC design. Sony was also said to be in on the alliance. Until the joke was exposed, readers hotly debated the merits of such a deal.

*

Giga appetites. Users' voracious appetites for mass storage were reflected in active discussions of experiences with gigabyte disk drives and more-exotic storage options. Sony's new optical for reading and writing inexpensive 128MB media with a 40ms access time for less than $1000 was hotly anticipated. A poster noted that thanks to 20MB floppies, possible CD-ROM distribution of future NeXT system releases, and cheap high-capacity hard disks, multimedia on the NeXT may at last take off. There's a lot to fill up all that mass storage: The NeXT archives have more than doubled in size since *NeXTWORLD's* last issue and now include new applications, pictures of net personalities, demos, games, sounds, and music.

*

Grass roots. A campaign was launched to convince Quark to finish the NeXT port of its admired layout program, XPress. The idea is to sign up enough guaranteed buyers to cover Quark's remaining development costs. To add your voice, write to Tim Gill at Quark, 300 S. Jackson St., Denver CO 80209. Similarly, Dan Goldman of Digitalk says he will port SmallTalk to the NeXT if he hears from enough potential buyers. Call him at 213/645-1082 or write Digitalk, 9841 Airport Blvd., Los Angeles, CA 90045.

*

Stats I. Postings to comp.sys.next continue to rise. By midyear, the group was the 18th most read out of 1400 news groups, had captured 4 percent of all netnews readers (a total of 40,000), and was transferring a whopping 3.7MB of news per month. Bursting at the seams, the group voted by a 7-to-1 margin for splitting into several subgroups: comp.sys.next.announce, a moderated list for the most-important announcements, events, user group meetings, and public-service postings; comp.sys.next.programmer, for programming questions, tips, and techniques; comp.sys.next.sysadmin, for help setting up, running, and enhancing NeXTs and their networks; and comp.sys.next.misc (about half of total postings), for all other postings. International postings are growing, including some that suggest that the technical and economic transition to internationlization has not always been smooth.

User Group News

New services. The San Diego and Denver groups have added bulletin boards; Dallas and Houston have launched newsletters. Several groups including Boston last spring and Denver last summer, have even sponsored full developer camps. A full developer camp includes massive preparation, including amassing lots of NeXTs in a room, finding paying customers, and convincing NeXT to let lots of user group "assistants" come for free to "help."

*

NUJ gets new editor. The excellent BuZZNUG newsletter, The *NeXT Users Journal*, has a new editor. John Bennett has taken over from Erica Leibman. Great run Erica, and welcome John. NUJ is published over the Internet and is available free to all.

*

Adobe goes on tour. Adobe, taking on the trappings of a major rock group to promote Illustrator for the NeXT, has been on the road. Their '91 North American User Group Tour has included stops in Denver, Los Angeles, Boston, San Francisco, New York City, and Washington D.C. Groups have been wowed by Adobe's best-yet version of its illustration package.

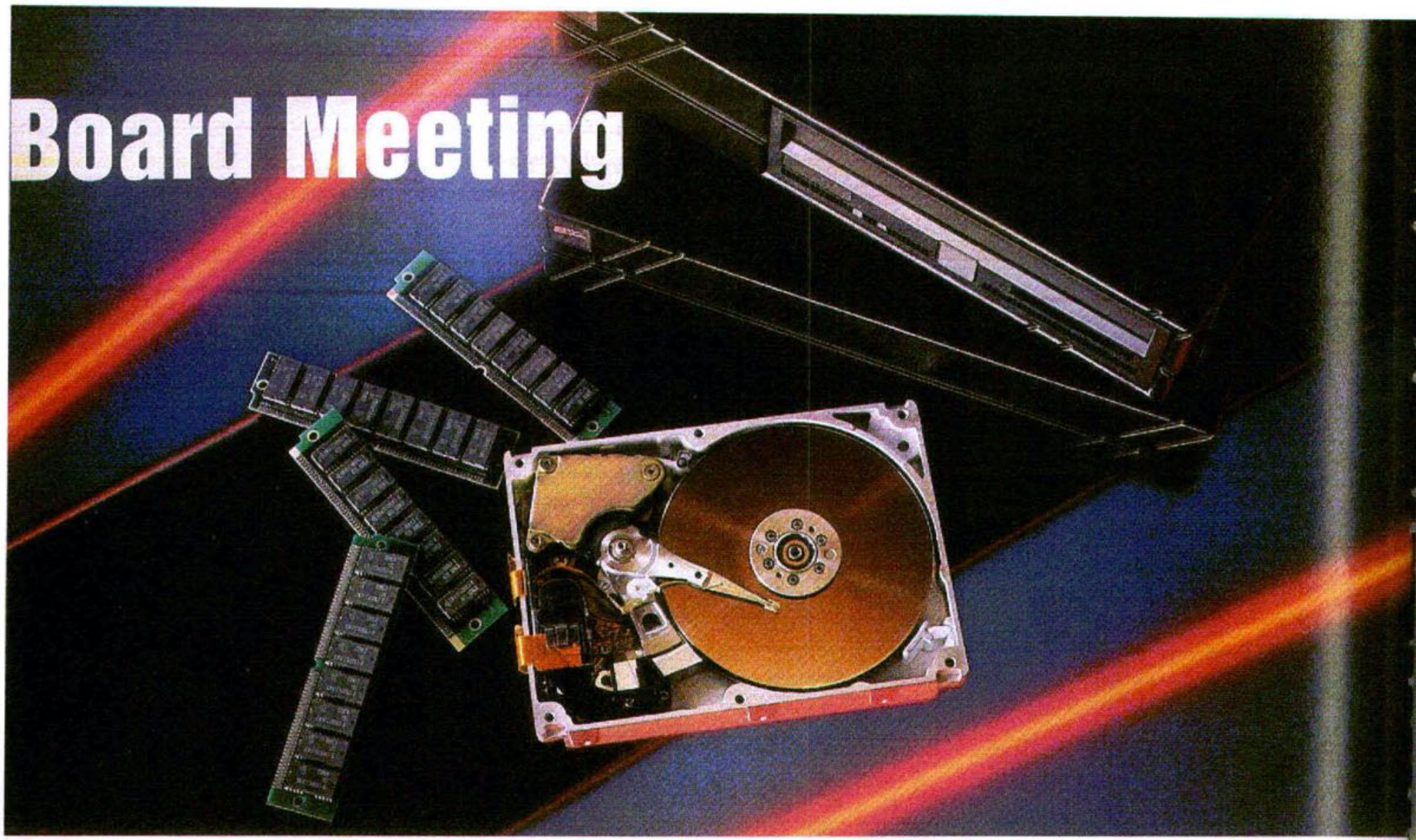
*

New forum. CompuServe's NeXT forum is off to an active start. Moderated by Dave Bowdish and Young-Kyu Yoo, active threads include design ideas for a new cube and long discussions about optical drives versus CD-ROM. Threads focusing on the future of NeXT and the Apple-IBM agreement are popular as well. Participants engaged in a contest to predict NeXT's second-quarter financials. To join, type go nextforum at the CIS prompt. Bowdish's address is 76711,143.

*

Stats II. With new groups formed in Switzerland and Taiwan, there are now 151 NeXT user groups in 40 states and 20 foreign countries. Total membership is pushing 10,000 worldwide.

by CHARLES L. PERKINS AND DAN LAVIN



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NeXTWORLD

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NEWS IN BRIEF

Adobe Systems will add Illustrator file compatibility, greater control over kerning and baseline shift of letters, and new menus to TouchType in version 2.1, now in beta testing. The updated version of the type-manipulation package Adobe acquired from Right Brain Software also will get new packaging, documentation, and technical support. "We're committed to the NeXT and want to publish applications that we think are worthy," said Tim Myers, product manager. Adobe is also now shipping three sets of PostScript fonts to complement its original package of type styles available for the NeXT. Types include Bodoni Poster, Trajan, Cooper Black, Lithos Bold, and the Adobe Garamond family. "Eventually we'll make all our fonts compatible with the NeXT," a representative said.

Lighthouse Design recently shipped Void, a networked multiplayer video game for the NeXT. Void features stereo sound, color graphics, and near-3-D animation. Multiple users can play simultaneously across the network, communicating via "intercockpit messaging." The object of the game is to destroy opponents or opposing teams. It lists for $149 for a three-player pack and is available through NeXT Connection and dealers. Lighthouse also began shipping Diagram! 1.1 in August. This interim release makes Diagram! files and files linked to them usable with Digital Librarian. Other changes include bug fixes and more sample files. Diagram! 1.1 costs $399, the same as the previous version; upgrades are free. Lighthouse can be reached at 800/366-2279.

NeXT's third tech alert of 1991 relates to a potentially serious bug in NetInfo. Spurious directories can appear as a result of normal operations. When the directories are deleted, the NetInfo database may become corrupted. Network administrators can obtain the full tech alert from NeXT or any dealer.

[SEE BRIEFS, PAGE 18]

Chip choice weighed for new systems

by SIMSON L. GARFINKEL

Palo Alto, CA – In the wake of new industry alliances that alter the competitive lineup of advanced CPUs, NeXT is reevaluating its decision to base its next-generation systems on the Motorola 88110 processor, according to sources.

NeXT had been expected to develop a new high-performance workstation for introduction in 1992 based on the 88000 chip family. The decision by Apple Computer to base its future systems on a new Motorola implementation of IBM's Power PC RISC technology has apparently caused NeXT to reconsider its own plans.

"Motorola's big potential customer was Apple. If all their hardware people are concentrating on the [Power PC] chip, it seems unlikely that they will spend much effort on the 88K" said David Henkel-Wallace, a founder of Cygnus Support, a Palo Alto company that supports compilers and advanced system

[SEE CPU, PAGE 18]

DTP vacuum to be filled

by DARCY DINUCCI

San Jose, CA – While Quark has put plans to port its Macintosh page-layout leader XPress on the back burner, small developers are rushing in to fill the page-layout gap on the NeXT.

Pages Corporation, Right Brain Software, and Archetype are each developing full-featured page-layout programs that should be shipping by early next year. Right Brain and Pages will show early versions of their products at the Seybold Computer Publishing Conference here this month. At press time, it was not known whether Archetype would be ready to show its product at Seybold.

Other new products expected at the show include a presentation software package from Lighthouse Design of Chevy Chase, Maryland; an illustration package from Altsys of Plano, Texas; and a film recorder from Cube Technologies of Houston.

"The hope for NeXT is to attract all those crazies with neat ideas who want to leverage the platform and do things more effectively than they could some place else and who would get crushed in another marketplace," said Jonathan Seybold, publisher of Seybold Publications (see our Seybold interview, page 16).

RACE FOR THE PUBLISHING MARKET

PAGE LAYOUT	ILLUSTRATION	IMAGE PROCESSING
FrameMaker FrameTechnologies	Illustrator Adobe Systems	Artisan Media Logic
Eclipse* Right Brain Software	TopDraw 2.0 Media Logic	? Cube Technologies
? Archetype	Stealth* Altsys	Photoshop Adobe Systems
Bonzai, Hokusai* Pages Corp.		
🟦 released product		*Code name

NANCY TERZIAN

"It doesn't take us the kind of capital investment that it takes large companies that are management-loaded," said Steve Sarich of Cube, which also has a photo retouching program under development.

Of the page-layout programs, Right Brain's product, code-named Eclipse, takes the most traditional approach. "Our goal was to take every feature and make it 10 to 20 percent better than it's been done before," said Glenn Reid, president of the Palo Alto, California, company. Reid said the program includes improvements in the usability of standard features such as selecting objects. It also will offer new features, such as the capability to shear objects.

"We're making it as blazingly fast as we possibly can. It will be 50 to 100 times faster than Illustrator in placing Encapsulated PostScript files," Reid said.

Archetype's product will be built in user-extensible modules that take advantage of the NeXT's object-oriented programming environment, according to sources. The company, based in Waltham, Massachusetts, currently publishes an advertising page-makeup program for Windows, but the NeXT program will be a full-featured layout program, sources said.

The Pages product will be offered in two modules: one for end users and one for designers. "We're trying to address the concerns of people who spend a lot of time tweaking documents because they're not sure they look right," said Bruce Webster, president of the San Diego company. Webster said the product can be thought of as "a font editor for designs," which in-house or independent designers can use to create design modules for

[SEE DTP TOOLS, PAGE 18]

Book 'em, Dano: NeXT gains sales in station houses and trading floor

by DAN LAVIN

Redwood City, CA – NeXT continues to close major sales in its target markets with sales to the Toronto police and a Connecticut financial-services firm.

The trading company, which asked not to be named for competitive reasons, reportedly has committed to 500 NeXT machines and is taking delivery of the first 50. According to a manager at the company, the machines will be used in trading-floor and database applications.

NeXT beat strong competition from both Sun and Compaq to close the deal. The units, to be purchased directly from NeXT, were selected for their advantage in developing in-house applications, the manager said.

Toronto's police department will use up to 70 NeXTs for a system called RICI-Mug, which helps match suspects to mug shots using image processing technology. The system is being developed by Comnetix, a new NeXT VAR with experience in police technology.

"NeXT workstations' extreme power and flexibility, coupled with low price, were what let us make RICI-Mug a reality," said Comnetix president Edward Escubedo. "The software could also be useful for talent agencies, real-estate companies, product cataloging, and security organizations." ◆

NeXT prepares to ship GNU source code

by SIMSON L. GARFINKEL

Redwood City, CA – After dragging its feet for nearly a year, NeXT plans to release the source code to its Objective C compiler and debugger in October, according to Kevin Wells, software product manager.

The NeXT compiler and debugger are modified versions of the GNU C Compiler and GNU Debugger, written by the Free Software Foundation (FSF) of Cambridge, Massachusetts. Under the terms of its license agreement with the FSF, NeXT must provide the source code for the compilers "without charge except for the cost of media, shipping, and handling."

But NeXT has failed to fill users' orders for the source code since the release of NeXTstep 2.0, according to users. "We take very seriously the requirement for all redistributors of our software to make source code available," said Richard M. Stallman, president of the FSF. "If

[SEE COMPILERS, PAGE 18]

INTERVIEW

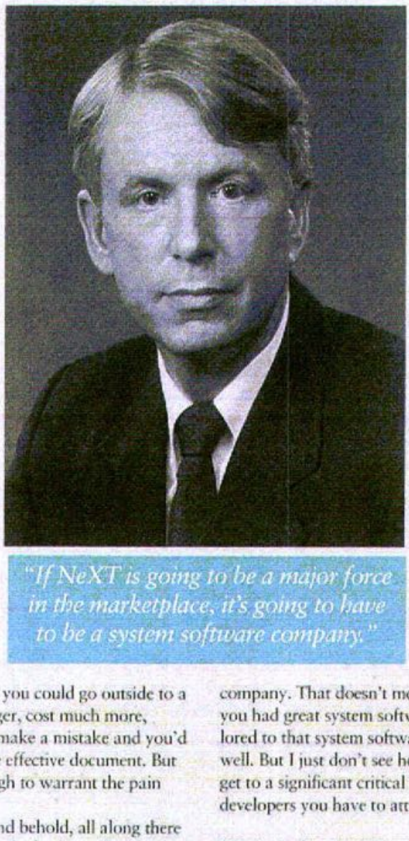
Jonathan Seybold: NeXT's big challenge is still software

On the eve of the Seybold show, NeXTWORLD *editors Dan Ruby and Darcy DiNucci visited Jonathan Seybold at his Malibu, California, offices for an in-depth interview about NeXT's prospects in the desktop publishing market.*

NW: What are main benefits of the NeXT for publishing? What are the main drawbacks?

JS: Take Illustrator, for example. The biggest advantage is that you can work directly in Display PostScript. On the Mac, because it's a QuickDraw machine, you end up working in an outline form and then saying, "Okay, go and render this for me," and sit there and wait for it to render it for you. On the NeXT machine, you're working directly with Display PostScript. It makes it a much more potent program.

The main problem is software. In the publishing market place, what NeXT needs is QuarkXPress or its equivalent.



"If NeXT is going to be a major force in the marketplace, it's going to have to be a system software company."

NW: Why specifically QuarkXPress?

JS: Well, I'd settle for PageMaker, too. But, basically, those are the two leading page-layout programs.

The kinds of things that NeXT could really capitalize on would be doing the stuff that the Mac is running out of power for – the high-end graphics stuff. [NeXT] really would have the advantage. Particularly with all the color stuff, you can imagine what NeXT could offer. But to do that, you need a really good page-layout program.

NW: What about Pages?

JS: Pages is a very interesting development. Pages was conceived as being for the mass office marketplace. But the magazine people looked at it and said, "Gee, there are some neat some things here."

It reinforces an argument I've been making for a long time. I have never believed that there is a fundamental difference between the publishing marketplace and the office marketplace.

With old technology, you were forced into a choice. If you wanted to produce a document, you could do it yourself in your office, where it was inexpensive and you had control and fast turnaround. It was typed and printed, and it looked lousy. Or, you could go outside to a craft – people using craft equipment – and it would take much longer, cost much more, you'd lose control over it, you'd go back and forth because they'd make a mistake and you'd have to correct the mistake, and so forth. You'd have a much more effective document. But you would only do that with documents that were important enough to warrant the pain and cost of doing that.

Now we've removed that barrier, and what we're seeing is, lo and behold, all along there weren't two classes of documents. The publishing people are just at the leading edge; they run into the walls first. And if they run into problems, they don't get tangled up in them; they're sophisticated enough that they can work their way out of them. If you don't solve the problems for them and you let the office guy run into the same problems, you'll be through. Pages is a good example of that. Here's a product that was intended for the naive user, but the first acceptance of this, as often happens, is from sophisticated users who understand what it does and what its potential is.

NW: So for the NeXT in the publishing area, the current glaring holes are in page makeup and image processing?

JS: Yes. And what NeXT can add is that the page-makeup stuff can be customizable.

The software that's available in the mass market doesn't really address all of what any particular person does, so we shouldn't be surprised that we haven't gotten the productivity gains that we thought we were going to get. You need to build things that are much more focused on an industry or an application or an organization, and leverage what the people doing those tasks really do.

Now that's too specific to support mass-market application software. It's the same thing we were doing back in the 1970s with custom application programs. The only way I can think we're going to get to this area is through what we around here call "Lego software," software modules that can be plugged together to meet the needs of a larger application. You select modules, you link them together, and you may very well add some value of your own.

Now you really need an object-oriented environment to do this. That is how you could really leverage the NeXT environment, to be fundamentally different from things that exist elsewhere.

NW: The kinds of things that people use QuarkXTensions for?

JS: Right. One example is the system that *Time* magazine has been playing with and is marketing. They've written a whole bunch of software for editing copy, and they've written a QuarkXTension that basically places the copy automatically onto a page. The thing looks like a seamless whole rather than a bunch of individual programs.

NW: And that's the direction that something on the NeXT should go?

JS: Yes. In a much more open fashion. And that's the sort of thing that can make a fundamental difference. It could be a whole different metaphor of how one builds application solutions. It's important to publishing, but I think it's also important as a metaphor to be emulated for other kinds of software.

NW: What about color prepress? Some developers seem very excited about the platform, saying that the NeXT has the color and the performance that would allow you to do the kind of thing you could do on a Scitex.

JS: It is a natural platform. But ever since three weeks before the announcement of NeXTdimension and the NeXTstation Color, we've had conversations with companies – good-sized companies – who really wanted to develop color software for the machine. And so far all the smaller companies are doing things, and the bigger guys have backed off. The bigger guys haven't had the nerve to commit to NeXT and NeXTstep.

NW: So who's going to do this kind of software?

JS: The hope for companies like NeXT is to attract all those crazies with neat ideas who want to leverage their platform and do things more easily and more effectively than they could someplace else and who would get crushed in some other marketplace.

NW: And those applications will lure people to the platform?

JS: You could argue that if NeXT continues on the ramp it is on, it will be an incremental haul, but it will be sufficient by itself to get one software developer, two software developers, and to gradually build up steam.

But I believe that if NeXT is going to be a major force in the marketplace, it's going to have to be a system software company. That doesn't mean it can't be a hardware company. In fact, I would argue that if you had great system software and you had the neatest hardware – hardware that was tailored to that system software – that gives you a major advantage in selling the hardware as well. But I just don't see how any individual player starting where NeXT is starting from can get to a significant critical mass by itself, to really attract the numbers of third-party software developers you have to attract to be a major contender in the marketplace.

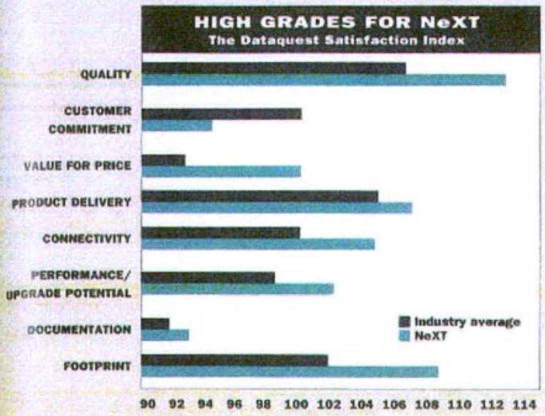
NW: And when NeXT has the software …

JS: If sufficient software were available, I think that the market would be immensely receptive to NeXT. Nobody could have gone to our conference last year and not been impressed with the level of attention that NeXT got. An independent survey of show attendees found that NeXT was the second-most remembered exhibit after Adobe and that it ranked first for the most impressive demonstration and presentation at the show. And the major reason for remembering an exhibit was interest in products. This was last year, when NeXT was showing the NeXTstation and color.

NW: So people are interested.

JS: Absolutely. If you look at what NeXT is doing from a system software and hardware standpoint, it's mostly the right stuff. I've been on them since '88 about connectivity with PCs and Macs, and NeXT's finally taking some shape there. You can point to areas where there needs to be some improvement, but by and large the challenge remains software. The challenge remains to get the neat software, enough software so that people can do their jobs better. ◆

HIGH GRADES FOR NeXT
The Dataquest Satisfaction Index



Indicators ranked by order of importance to customers

Survey finds satisfied users

by SIMSON L. GARFINKEL

San Jose, CA – NeXT users love their computer's quality and value but question the manufacturer's commitment to its customers, according to a recent survey conducted by Dataquest, a leading market research firm based here.

In the survey, the first of its kind in the workstation marketplace, Dataquest interviewed 1000 users of workstations across the United States to find out what they liked and disliked about the machines they are using. Overall, NeXT ranked second in the industry in customer satisfaction, behind Silicon Graphics, but ahead of Sun Microsystems, IBM, Hewlett-Packard, and other manufacturers.

The survey ranked customer satisfaction in eight key areas: hardware and operating system quality, product delivery, footprint, connectivity, commitment to the customer, performance and upgrade potential, value for the price of the workstation, and documentation. NeXT performed better than the industry average in every category except "commitment to customers," the category ranked second in importance by users, according to Steve Goeptge, Dataquest's vice president of marketing communications. In that category, Dataquest found NeXT to be significantly below the industry average.

"We are taking the feedback [about customer commitment] very seriously," said Elton Sotello, NeXT's manager of customer support. "We are taking a look at some of our support policies, in particular the way we handle problems and complaints that come in through the 800 number."

About 75 NeXT customers were interviewed for the survey. Dataquest plans to repeat the survey every quarter. ◆

OVERALL CUSTOMER SATISFACTION

① Silicon Graphics
② NeXT
③ DEC
④ Solbourne
⑤ HP
⑥ IBM

VCs back NeXT projects

by DAN LAVIN

Redwood City, CA – In an increasingly tight market for venture capital, at least two firms developing NeXT-specific software successfully attracted initial funding last month.

Pages of San Diego will be using the venture funding to develop an advanced desktop publishing system. The package will run initially on the NeXT but will soon be ported to other platforms, said Robert F. Kibble, a general partner of Paragon Venture Partners, based in Menlo Park, California, which contracted to invest $2.5 million in the company.

"Our goal is to get to cash flow break-even on NeXT and choose a follow-up platform. The advantage of NeXT is that it will show [the product] very well and get a lot of people to want the product on another platform. This is a cheap proof of concept and avoids an expensive launch on other platforms," said Kibble.

The second company, unnamed at press time, will publish WriteNow and other programs (see NeXT Ink in this issue and *NeXTWORLD Extra*, September 1991). At press time, the president of the new company, Randy Adams, had not yet disclosed the amount or source of his venture funding, but said that the investment was wholly independent of NeXT.

According to a venture capitalist at one firm that was approached by the new company but that declined to participate in the deal, the new company was seeking up to $5 million in capital. He said top NeXT executives were involved in the funding proposal.

"NeXT was going to jump start the company by helping to provide software packages, special support, and special access," he said.

Venture funding often provides the means for a small company to bring a product to market. In return, the venture capitalists usually receive a significant share of equity in the company.

Trying to attract funding for these new companies brought a new factor into the traditional venture-capital equation: the health, and prospects for success, of NeXT itself.

"As part of our due diligence we had to investigate the chances of NeXT itself. We visited the factory and met with Steve [Jobs] directly several times," said Kibble, who finally concluded that the NeXT's technical sophistication is one of the "best-kept secrets" of the computer industry.

The fast development cycle on the NeXT platform was sure to save money for the firm, said Kibble. Paragon estimates that NeXT will have an installed base of 225,000 machines by the end of 1993, with Pages's product holding a 20 to 25 percent market share.

But other venture capitalists who were approached to fund Pages were less impressed by NeXT's technology and installed base. "The number of [NeXT users] is pretty low right now. We like an opportunity to sell to millions of people," said Tench Coxe, general director of Sutter Hill Ventures of Palo Alto, California. ◆

NeXT Ink

by DAN LAVIN

The spinners

Spin control. The recent formation of a new software company, unnamed at this writing, to publish WriteNow and possibly other unbundled NeXT software, as well as software from other developers, raises some interesting questions.

The first issue to get out of the way is NeXT's interest in the venture. The mother company is doing a lot of hand-wringing to avoid any mention of the C word (Claris, that is). There is a key difference: Unlike Claris, Apple's software subsidiary, which is wholly owned by Apple, NeXT has no financial interest in the company.

But there are also some similarities. The company involves former NeXT employees and has a clearly preferential relationship, regardless of NeXT's protestations to the contrary. It is not as if the WriteNow account went out for open bid.

Ultimately, it does not really matter what the stock certificates read. It matters what the company will do. I am more than willing to believe that the company will operate as an independent software company, and I think that NeXT will be highly scrupulous about the relationship, but I also think that a taint will always exist. Non-favored software developers are certain to complain about unfair competition.

Spin cycle. Despite all that, the company will clearly be a positive force in the NeXT community. First, it is going to commercialize WriteNow, which will make for real competition in the word-processing category while also establishing a level playing field for the competitors. Sentimentally, I might mourn the passing of free WriteNow, but it is more important that there are be multiple commercial products in major software categories.

The company also will be a good thing for the community if it brings some of NeXT's internal applications to market. NeXT has some fantastic applications that it uses to run the company and create the product. The only thing standing in the way of the rest of us using these products has been the enormous expenditure of resource needed to commercialize them. An outside company will be able to move far more nimbly than NeXT ever could.

The company says it also intends to publish the work of small developers. The community has a lot of small guys creating great software, but they lack the resources to market, manufacture, and sell commercial products. Since the NeXT market seems risky to the outside world, these developers might have trouble getting represented by a traditional software publisher. With the new company's special relationship to NeXT, programs that are needed by the community but not necessarily commercial gangbusters have a chance to reach the market.

Finally, it will also write software of its own, focusing on major productivity software categories, where NeXT clearly needs more support. However, there may be a problem in this area.

Spin down. The new company is driven by devotion to a platform, not a set of customer problems. It will tend to select problems to solve based on holes in the market, not out of enthusiasm for a particular product. This has proven to be an unsuccessful tack in the past and is exactly why Claris has failed to dominate its market.

According to Jeff Tartar, publisher of *SoftLetter*, "The secret to building successful software companies is passion for products or problems, not passion for platforms. Real software entrepreneurs start by having insights into real customer problems. They don't start companies to exploit markets."

To sidestep this problem, I suggest that the new company avoid the mainstream applications. Instead, it should focus on encouraging small developers and publishing the applications streaming out of NeXT. As for internal development, what it should do is hire people with dreams, empower them, and let them run with them.

See, a whole column without saying spin-off! NeXT should be happy.

Partnership programs consolidated

by DAN LAVIN

Redwood City, CA – With the promotion of Max Henry to vice president and general manager for Pacific operations, NeXT's developer partnership group was consolidated last month as part of the company's marketing department. Donna Simonides was named to head the new group as director of developer relations.

Now all three segments of NeXT's product marketing strategy – hardware, software, and third-party – will coordinate even more closely, Simonides said.

The developer partnership group manages relations with independent software vendors and other third parties. Chris MacAskill has been named to replace Simonides as the manager of the developer advocate group. The advocates serve as a liaison between developers and NeXT.

Vendors seeking information about NeXT's registered developer program should call 800/848-6398. ◆

BRIEFS continued

Ingres Division of ASK Computers has dropped the NeXT from its list of supported platforms by nixing plans to offer the latest release of its relational database on the NeXT. "We have no plans to abandon that particular platform, but we don't know when and if we'll be porting 6.0 to the NeXT," said Glynnis Sears, an Ingres spokeswoman. This policy could leave some users orphaned, especially if the current version isn't compatible with the forthcoming NeXTstep 3.0. NeXT and Ingres are still talking, however, according to Margaret Chan, NeXT database advocate. "The excitement around DBKit [being released] in the near future could get them to port at least part of their product," she said.

Metaresearch has unbundled its popular SoundWorks program from its Digital Ears digitizer, for people who want to edit sounds but are satisfied with the quality offered by analog microphones and the NeXT microphone port. The unbundled SoundWorks version 2.0 costs $395. Digital Ears alone lists for $595. A bundle of the two is $795. SoundWorks allows users to cut, copy, and paste digitized sounds, as well as to control echo, reverb, and filtering. Metaresearch can be reached at 503/238-5728.

Wolfram Research recently released Mathematica 2.0 for the NeXT. Mathematica 1.0 or 1.2 users will be upgraded for free. Higher-education users will receive 2.0 bundled with new machines at no extra cost; for other users the program costs $1495. The documentation is an additional $75. Wolfram Research can be reached at 207/398-0700.

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Editorial Director: Dan Ruby; Manager: Darcy DiNucci; News Editor: Dan Lavin; Staff Writer: Simson L. Garfinkel; Copy and Layout Chief: Sue Troy

CPU

[CONTINUED FROM PAGE 15]

software on a wide variety of UNIX platforms.

"Even though the 88K is a perfectly fine chip, the stigma of rejection is now associated with it," said Michael Slater, editor and publisher of *Microprocessor Report*, an industry newsletter. "It is not going to have a lot of support from major computer companies, and it is going to be a sort of an oddball architecture."

Current customers for the 88000 family include Data General and Unisys. In June, Motorola announced that a special version of the chip will be used for microcontrollers in Ford Motor Company automobile engines.

Following the Apple-IBM announcement in July, Murray Goldman, general manager of Motorola's Microprocessor and Memory Technologies Group, made a statement underscoring "Motorola's commitment to supporting the system vendors and their customers who have chosen the 88000 RISC MPU family."

"Certainly, Motorola remains committed at least to the 88110," Slater said. "The whole thing is very much in flux, and everyone is trying to figure out what they are going to do."

Despite the 88000 family's liabilities, NeXT would retain at least one distinct advantage by staying with that chip family. With the close working relationship between the two companies, Motorola can add special features to the line that will serve NeXT's needs better. For example, the 88110 chip has special instructions to ease graphics operations and improve the performance of Display PostScript. It is possible that special, undocumented instructions might be available in the version of the chip provided to NeXT – but not to other companies.

While the 88110 would provide high performance, it may be limited in its range of available options. Although there are many versions of the SPARC and Intel 80386/80486 chips available, Motorola's 88100 comes in just four, with clock speeds of 16, 20, 25 and 33MHz, and initially the 88110 will be available at only one speed.

Other CPU candidates for future NeXT systems include SPARC, Intel, and MIPS microprocessors. Any of these choices would permit NeXT to bring new systems to market in 1992.

NeXT might also choose to wait for Motorola's 68050 chip, which would give the NeXTstation and NeXTcube improved performance without sacrificing object code compatibility with existing programs. However, Motorola is still not shipping the 25MHz version of the 68040 in quantity, and the 68050 chip is thought to be a long way off.

NeXT could also follow Apple and go with Motorola's Power PC. But that would entail an even longer wait. "The original 88K was about two years late. It should have been out in 1987, but wasn't available until 1989," said Michael Tiemann, Cygnus's president and author of the NeXT's C++ compiler. Tiemann expects that Motorola will have similar problems getting the Power PC chip out the door.

NeXT declined to comment on future systems.

DTP tools

[CONTINUED FROM PAGE 15]

use with the end-user program.

Media Logic of Pacific Palisades will show upgraded products at Seybold. TopDraw 2.0 includes a revised user interface and presentation tools for automatic wipes and dissolves in slide shows. Artisan 3.0 is a full-color image retouching application that the company expects to release by year's end.

One prominent no-show is Adobe Systems' Photoshop, a port of the company's Macintosh image processing program, which is not expected for NeXT until late 1992.

Compilers

[CONTINUED FROM PAGE 15]

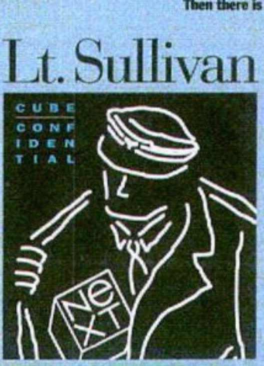
users don't get source code, they don't have the freedom that we are working to bring them."

Wells said that a variety of technical difficulties kept cropping up in getting out the source code.

"As far as I can tell, NeXT has had distribution problems with the GNU software no worse than the rest of its product line," said David V. Henkel-Wallace, director of support at Cygnus Support, which supports the GNU compilers. "I know there is a definite commitment among the technical folks, and supposedly from Steve Jobs, to honor the GNU Public License."

Sullivan bound for San Jose despite Agency cuts

Lt. Sullivan



Precision measurements are more a way of life at the Agency than on Chesapeake Drive, but lately Lt. Sullivan has been brewing coffee the NeXT way, measuring precisely 2.5 scoops of French Roast into the industrial machine at the office coffee station. He listened to the usual morning gossip from the crowd of sleepy office workers and then shuffled back to his cubicle to start his daily on-line ritual.

At the familiar CompuServe prompt, he entered "GO NEXT" to gratify his latest obsession – the fast-developing NeXT Forum. This is especially good for gathering information from the international community, as much of the world seems to have access. Another active watering hole is America Online, but since SoftPC can't handle DTR handshaking on the NeXT, it is not able to help out the growing number of NeXT users interested in logging onto AOL.

Thinking of SoftPC, Sullivan checked his file on the upgrade that agents say will run Windows better than any Windows machine. That will come in handy in the DOS-infected districts of the building, he thought, but users won't get their hands on it until early next year.

Meanwhile, MicroPhone II has experienced more delays than Lotus experienced bringing 1-2-3 to the Macintosh. It still isn't shipping, Sullivan noted ruefully. If the same malady doesn't strike Thoughtful Software, HyperCube could be ready by the end of the calendar year. Another development cycle nearing the finish line is the long-announced CD-ROM: Sex, Lies, & CD-ROM from Bay Area NeXT Group. It is the first exclusively NeXT CD to be made generally available.

Reviewing his calendar, Sullivan considered canceling his swing to San Jose for the Seybold show. With the Agency's travel budget soaring since late August, expenses are under heavy scrutiny these days. Why blow a trip when NeXT has shelved hopes of making a big splash with its Canon color printer? The holdup seems to be PostScript Level 2 implementation, which is now delayed until the release of System 3.0. On the plus side, NeXT's publishing advocates seem to have won their arguments with some favored developers to go public with early looks at page layout, image processing, and animation software. Many of them were leery of getting tagged as vapor products. Tipping the scales was the appearance the magazine was expecting him to make, so Sullivan reconciled himself to October in San Jose.

Meanwhile, back in Redwood City, attention has turned to the question of bundled software. Besides publishing WriteNow, the contract with NeXT gives Randy Adams's new company non-exclusive rights to one or more piece of NeXT's formerly bundled software. Speculation is centering around demo applications such as Icon and Draw. The code for Icon is, of course, a mess, but Keith Ohlfs's totally rewritten version, Pixelist, would make a nice commercial photo retouching product.

Then there is NeXTstep 3.0. One of the new features quickening pulses in Redwood City is a possible license of the Pantone Color Matching System for inclusion in the color picker. With a general license, individual developers would be freed from the need to individually license PMS for their application, lowering their software manufacturing costs significantly.

After intense lobbying from third-party developers and graphic artists, it looks like NeXT is finally scheduled to update the digitizing-tablet drivers in 3.0 to support the pressure-sensitivity features of the Wacom tablets. On the already announced AppleTalk networking support, there is some question whether it will include printer-access protocols (PAP) for easy printing from NeXT workstations to high-end PostScript imagesetters like the Linotype Linotronic L330, Agfa SelectSet 5000, and Scitex PS Dolev.

Can you say "conflict of interest"? The parent company that publishes this magazine has just moved its Sun journal, *SunWorld*, into the same division, Integrated Media, that houses sister publications *Publish* and *NeXTWORLD*. In a new twist, the two rival platforms' publications will be sharing one set of offices in San Francisco, to the chagrin of both sides.

[Editor's Note: Okay, Sully, I guess that's the reward I get for giving you *carte blanche*. Our agreement is that I don't cut your items, but who says I have to sit here and be quiet? Yes, *SunWorld* is moving into our building, which also includes prominent publications covering the PC and Macintosh. No, we won't share information or pursue common strategies.]

With world vodka supplies in question, we must learn new ways to entertain ourselves. Interesting information makes the world more fun.* NeXTWORLD *T-shirts make your wardrobe much nicer as well. E-mail Lt. Sullivan@nextworld.com or call his voice mail at 415/978-3374. But don't call the Agency. They might start examining his expense reports.

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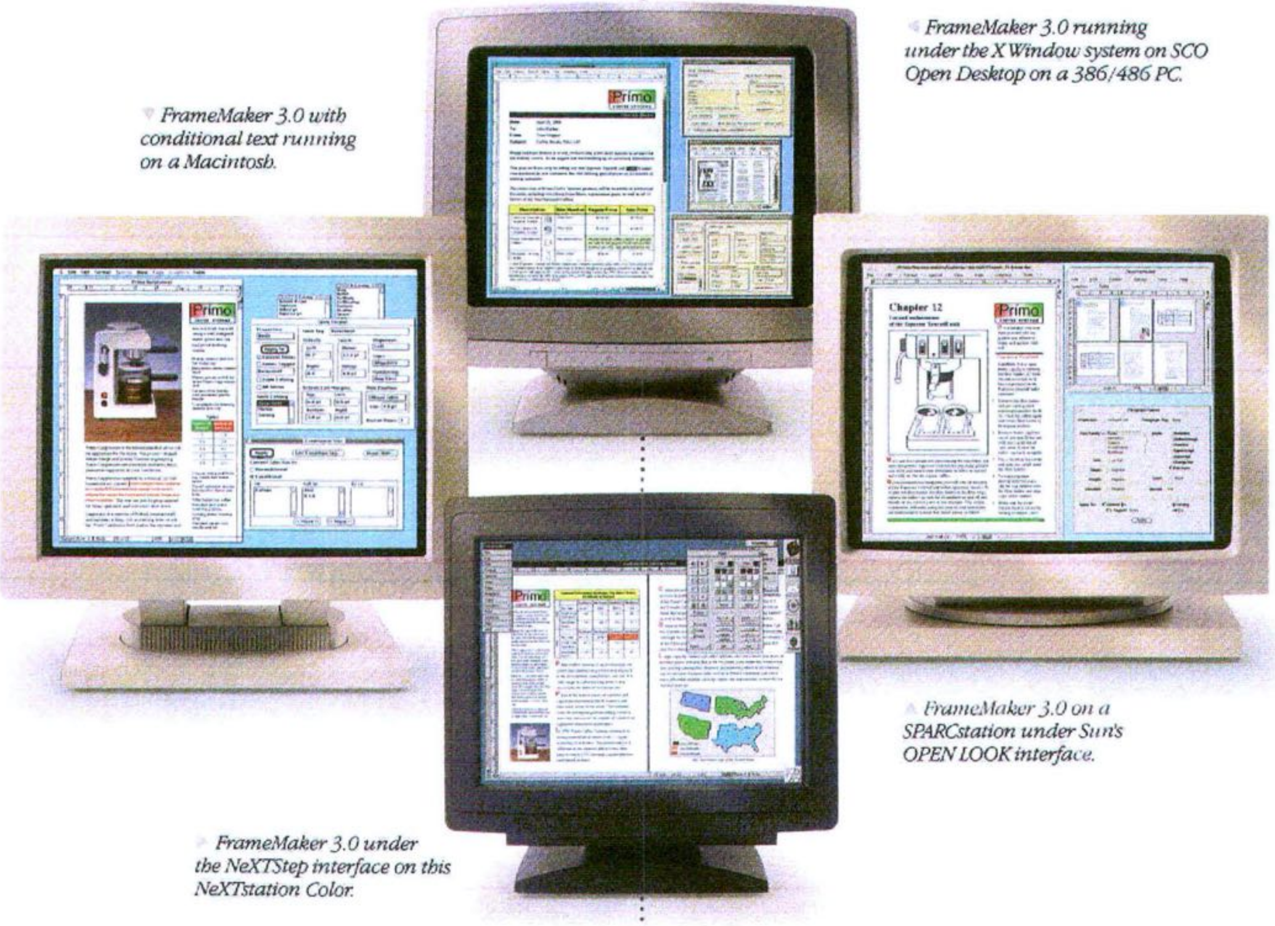

FrameMaker 3.0 with conditional text running on a Macintosh.

FrameMaker 3.0 running under the X Window system on SCO Open Desktop on a 386/486 PC.

FrameMaker 3.0 on a SPARCstation under Sun's OPEN LOOK interface.

FrameMaker 3.0 under the NeXTStep interface on this NeXTstation Color.

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SPECIAL REPORT

TRAVEL GUIDE TO N

Nothing inspires anxiety as much as the unknown. For travelers, it might be arriving at night in a strange

foreign city. For NeXT

users, it is dealing with the complexities of computer networking.

As with traveling, there are two ways to approach network-

ing. There are the packaged tours: the out-of-the-box proprietary solutions, exemplified by Novell's popular NetWare for PCs, and open-systems networking, which allows you to plan your own itinerary.

Whichever approach you take, you'll find that a NeXT is an excellent traveling companion. From the start, NeXT has supported open-systems standards such as Ethernet and TCP/IP and has tamed UNIX system administration with NetInfo's point-and-click

network management.

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NeXT to Bridge the Great Divide

The undisputed king of file sharing in the DOS world is Novell's NetWare. The Utah-based company's de facto standard network file system runs on so many computer systems that the company has lost track of how many, although it knows that the number of NetWare nodes is more than a million. Novell ships 20,000 copies each month, according to a company spokesperson.

Although NetWare is available for the Macintosh, most of Apple's network users run AppleShare, the network file system built into the Macintosh operating system. Meanwhile, most UNIX computers use NFS (Network File System) developed by Sun Microsystems.

All of these systems provide different ways for doing basically the same thing: moving information over an Ethernet so that files stored on one com-

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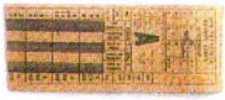
NeXT NETWORKING

Now NeXT has announced that it will soon directly support Novell and Macintosh networks in an upcoming NeXT operating system release. NeXTs will plug into NetWare or AppleShare networks and go to  work, seamlessly and transparently.

All this may change popular attitudes toward networking.

Because of the prevailing fear of networking, many companies have not discovered that networked "interpersonal" computers are vastly more useful than stand-alone machines. Electronic mail is a glossy example of the benefits, and the advantages of network file sharing and printer access must also be considered.

With this travel guide, the inexperienced networker will be able to explore the copious connectivity options for NeXTs in large workgroups.

puter's hard disk (the server) look like they're stored on another (the client). Unfortunately, they're all incompatible: You can't use a Macintosh computer with a NetWare or NFS server unless you have special hardware or software, even if they're all all on the same physical Ethernet.

For NeXT users, all of that is about to change.

Deep in the heart of the NeXT's Mach operating system is a piece of software called the file system switch. Originally developed by Sun Microsystems in the early 1980s, the switch isolates the differences between different file systems and provides a unified view of the Mach kernel. It's the file system switch that makes NFS work. Every time the user tries to read or write information that's in a file, the switch looks at the file name and sends the request to the appropriate part of the Mach kernel. →

OGRAPHY BY HOLLY STEWART

Networking the NeXT

Whether you are networking personal computers or professional workstations, you'll be preoccupied with certain essentials: sharing files, printers, and electronic mail. But first you'll have to assemble a working network.

Networking requires that computers be wired together – but wiring alone doesn't automatically create a network. The electrical signals that pass through the cables must conform to protocols if computers are to recognize the presence of data. Protocol standards are written by standards organizations (such as ISO, the International Standards Organization) or are proprietary (for example, Apple's AppleTalk). Each computer also must recognize the presence of other computers on the network and present access to files on the other computers, requiring a network-oriented operating system.

You can think of network standards as a layered cake in which the lower layers refer to the physical and electrical standards (for example, which voltage represents a 0 and which represents a 1) and the higher layers specify protocols (for example, the way that electronic mail is passed between computers).

PC connections

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There are few obstacles to the simple exchange of files between DOS-based personal computers and NeXTs. File transfer across Ethernet is straightforward, given the availability of a wide range of PC-based TCP/IP tools and the fact that 3.5-inch floppy disks glide back and forth between the machines. But full-tilt networking is another story. The vast majority of PC networks use versions of the Novell NetWare operating system rather than DOS. Right now, NeXT and Novell networks do not talk without the costly addition of UNIX add-ons for NetWare.

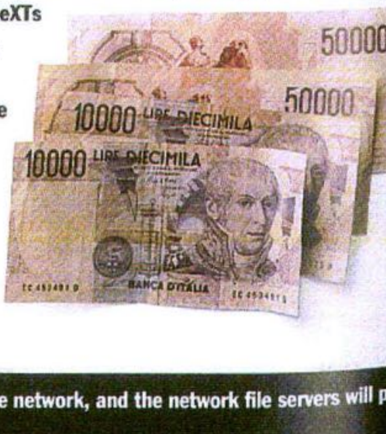
Happily, NeXT and Novell have been working to eliminate the barriers to NeXT/NetWare internetworking. The next release of the NeXT operating system will allow NeXTs to join Novell networks as NetWare clients. The connection will be seamless: PC-based Novell file servers will show up in the NeXT File Viewer with their own icons, which will behave much like the NeXT's Net icon. You'll drag folders and files back and forth from NeXTs to NetWare 286 or 386 servers with as much ease as you move files within a NeXT today.

Macintosh connections

When NeXTWORLD first looked at Macintosh-to-NeXT connectivity, we found ugly obstacles (see "NeXTworking," *NeXTWORLD* April 1991). The NeXT could read MS-DOS floppies, but without expensive third-party software, a Macintosh floppy was simply ignored. Network connectivity was no prettier – Macs and NeXTs could be tied together by Ethernet cables, but NeXTs refused to recognize the presence of Apple computers without pricey add-ons.

The scenery is about to change, now that NeXT has plans to better integrate NeXT computers with Macintoshes. NeXTs will soon read high-density Macintosh floppies. Perhaps more significantly, NeXTs will recognize Macintoshes across an Apple network. As with NeXT's new support for Novell networks, integration with Macintoshes will be transparent, seamless, and will be included free of charge with NeXTstep 3.0.

While you are waiting, here's a look at today's options for Macintosh-to-NeXT connectivity.



→ NeXT's version 2.0 operating system used the file system switch to add support for MS-DOS floppy disks and CD-ROMs. By placing the smarts for understanding these disk formats inside the kernel, NeXT made data stored on these disks accessible to every program running on the computer.

The same thing is about to happen for NeXT users who work in offices with PC networks. In a few months, you'll be able to just plug your NeXT into an existing Novell or AppleShare network, and the network file servers will pop up in workspace.

To make this piece of network magic happen, NeXT has developed two programs that will translate the Novell and AppleShare protocols into NFS, says Kevin Wells, a NeXT software manager. From the user's point of view, a file stored on the network will behave the same, no matter which kind of server it

Making the connection

The base layer is the physical connection: the wires. For a NeXT network, the wires are either twisted-pair telephone wire (conforming to the 10Base-T standard) or coaxial cable (RG 58/U). Twisted pair is often already installed between offices and a central utility closet. If so, you need only a twisted-pair hub or concentrator for your wiring "star." For smaller networks, it's often easier to install coaxial cable from computer to computer in a daisy chain.

Above the layer of cables and plugs, the Ethernet protocol provides a way to assemble data into frames that can be sent from computer to computer. Frames can find their way only around a local area network, so another layer, the Internet Protocol (IP), adds an IP address to a frame to make a packet.

The last layer, the Transmission Control Protocol (TCP), is used to transport data from one application to another.

File transfers

The TCP/IP protocol combination is available for almost every computer system and allows a few rudimentary applications to communicate between any kind of computer. The most important may be a file transfer program, such as **ftp**, which is available as a UNIX command on the NeXT. Use ftp to transfer files between a NeXT and virtually any other computer on an IP network. Another file transfer command, **rcp** (Remote Copy), can be used between NeXT and other UNIX computers.

Making the connection

PCs have been joining Ethernet networks for years. Most Novell installations are connected by thin Ethernet coax or twisted-pair; other PC networks use Ethernet interface cards and cabling as well.

Ethernet network interface cards are readily available for PCs and are often discounted to less than $200. But installation can be messy; you must set several jumpers to specify memory addresses, I/O addresses, and hardware interrupt settings, and these can conflict with other cards, ports, or hard drives. Furthermore, be certain that the software you intend to use supports the Ethernet card you plan to purchase. Ethernet driver software comes with application packages, not with the cards. Once you've found the right hardware and software, you must build a configuration database that includes IP addresses of all the computers on the network.

File transfers

It's possible to transfer files between NeXTs and PCs over an ordinary serial cable with a telecommunications application such as Kermit. But if you're going to exchange files frequently, you'll find it easier to set up an Ethernet connection and use a file transfer utility. Several implementations of **ftp** are available for PCs. Popular commercial versions are FTP Software's PC/TCP Plus and The Wollongong Group's PathWay Access for DOS (formerly known as WIN/TCP).

Making the connection

Macintoshes are most often linked using built-in LocalTalk ports and twisted-pair cable; high-performance Macintosh networks almost always use Ethernet adapter cards and twisted-pair or coaxial cable for Apple EtherTalk connectivity.

Twisted-pair or coaxial Ethernet ports can be added to any Macintosh model for about $300. Apple and third-party manufacturers offer Ethernet interface cards. Several manufacturers offer Ethernet adapters (attached by SCSI or serial ports) for Macintoshes that have no internal expansion slots (the Plus, Portable, and Classic).

Once you've got Ethernet, your NeXTs will fit right in. Soon, NeXT will support EtherTalk. For now, add Apple's MacTCP driver – a layer of protocol software that allows the Macintosh operating system to send IP packets via Ethernet.

File transfers

If you use both Macintosh and NeXT, you'll find it difficult to live without some form of file transfer.

Three Macintosh applications use **ftp** to transfer files to and from UNIX systems: Network Resources Corporation's MacFTP, Intercon System's TCP/Connect II, and Wollongong's PathWay Access. Each of these compensates for file format differences between Macintosh and UNIX. From the Macintosh, you may choose to transfer files in ASCII mode or MacBinary mode. From the NeXT, you can transfer files using the NeXT's **ftp** command, but an ftp server must be running on the Macintosh.

sides on. And by making the NeXT speak the language of these PC network e systems directly, NeXT obviates the need for special software on the other nd or special hardware in the middle. NeXT's Novell client will work with NetWare 286 or NetWare 386. The AppleShare client will work with AppleShare servers running under Apple's System 6 or System 7.

The new software should be available by the first quarter of 1992, says Wells. Although the network clients will be bundled with version 3.0 of the NeXT operating system, they might be made available before that on floppy disk. NeXT will also adding native support for high-density Apple floppy disks at the same time, he says.

BY SIMSON L. GARFINKEL

Networking the NeXT

File sharing

File sharing is as different from file transfer as a scooter is from a chauffeured limousine. ftp is adequate for the occasional exchange of files, but real networking requires that files from a remote computer appear as if they were stored on your desktop system. Without any commands, you should be able to launch an application and go to work, no matter where a file may actually reside.

NFS (Network File System) is the prevalent file system on most UNIX computers. On the NeXT, the File Viewer is your window into NFS – a window that shows files on remote computers as easily as those on your computer's own hard drive. The other computers don't have to be NeXTs, as long as they are running NFS and their file systems are exported to the network.

Data compatibility

After you've got the file where you want it, will you be able to use it? The answer has to do with the application that created the file and the applications on your own computer.

If you are trying to share data between a NeXT and another vendor's workstation, your best bet is to use the same application on the two systems. Fortunately, most of the popular NeXT applications have counterparts on other platforms.

If you're not using the same application on differing computers, you'll have to exchange the data in a common format. For example, WriteNow can exchange files in RTF, Microsoft's Rich Text Format. Improv can read spreadsheets in the WK1 format. And of course, all NeXT graphics programs can read files in TIFF and EPS formats.

PC connections

File sharing

Your choice of a PC-to-NeXT file sharing approach may be dictated by previous commitments. If you're starting with a fresh slate, the best choice for networked PCs may be NFS, which is much easier to administer than NetWare or competing networks. Each DOS machine will require NFS client software on top of DOS and a TCP/IP transport mechanism. Both FTP Software and Wollongong deliver the goods, in the form of InterDrive and PathWay Client NFS, respectively. Sun Microsystems also offers its PC-NFS package for DOS. If your company has standardized on NetWare, you'll already have a network. If you're using NetWare 386, you can purchase Novell's NLM that allows file sharing between NetWare 386 and NFS networks now, or wait for NetWare client support in NeXTstep 3.0.

Data compatibility

Only a few applications are available in versions for both NeXT and PC: WordPerfect, Adobe Illustrator, and Mathematica. Files from these applications can be exchanged without much trouble.

If you're not using one of these applications, you'll need to exchange information in a common format. Unless your word processor reads RTF, you'll probably push documents back and forth in ASCII. Improv can exchange spreadsheets in WK1 format, which most DOS spreadsheets can read. Graphics are problematic; only the most gifted PC graphics applications support EPS or TIFF files.

Insignia Solution's SoftPC offers the ultimate in data compatibility, allowing you to run a PC application and its files as if your NeXT were a PC clone.

Macintosh connections

File sharing

With NFS software for the Macintosh or an AppleShare server running on a NeXT, the NeXT file server will show up on the Macintosh Desktop. NeXT's promised AppleTalk support will make the contents of Macintosh hard disks available in the NeXT File Viewer.

For now, if you have only a few Macintoshes to connect to a NeXT, you will want to buy an Ethernet interface card and NFS software for each Macintosh. If you have more Macs, you can combine Macintosh NFS software with an Ethernet-to-LocalTalk gateway such as Cayman Systems' GatorBox or Shiva's FastPath. The Mac's built-in LocalTalk cable connects to the gateway box; an Ethernet cable is connected on the other side; and two networks are joined.

Data compatibility

The NeXT's productivity applications all have sisters on the Macintosh. Files created by WordPerfect, WriteNow, FrameMaker, Illustrator, and Wingz can be used on either the NeXT or Macintosh without translation.

If you are using a word processor, such as Microsoft Word, that doesn't have a counterpart on the NeXT, you must save your file in RTF; if your word processor doesn't have RTF, be prepared for straight ASCII text, without fonts or formatting. Among spreadsheets, the WK1 format provides a path between Excel and Improv; Wingz can read and write Excel spreadsheets directly. Graphics files can be exchanged if they are reduced to TIFF or EPS files.

Buyer's Guide

FastPath – Shiva Corporation, One Cambridge Ctr., Cambridge, MA 02142. 617/252-6300

GatorBox – Cayman Systems, 26 Lansdowne St., Cambridge, MA 02139. 617/494-1999; e-mail: carol@cayman.com

MacFTP – Network Resources Corporation, 2450 Autumnvale Dr., San Jose, CA 95131. 408/263-8100; e-mail: NRC.MKTG@applelink.apple.com

NetWare NFS – Novell, 122 E. 1700 South, Provo, UT 84606. 800/526-5463; e-mail: kauger@novell.com

PathWay Access, PathWay Client NFS – The Wollongong Group, 1129 San Antonio Rd., PO Box 51860, Palo Alto, CA 94303. 415/962-7200, 800/962-

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Printer

Printing

NeXT computers can print to any PostScript printer attached to another networked NeXT. NeXT computers can also print to any PostScript printers that are connected to virtually any UNIX workstation running the Berkeley lpd network printing system

On the other hand, NeXT can print only on PostScript printers. If your organization has a central UNIX system with a high-speed line printer connected to it, your NeXT won't be able to send information to it. Mac and PC printers, even PostScript ones, are also off-limits without complicated gateways – at least until release 3.0 of NeXTstep.

Mail

The Simple Mail Transfer Protocol (SMTP) is the Rosetta Stone that decodes the dozens of proprietary mail systems in tens of thousands of isolated installations. The NeXT platform supports SMTP via NeXTmail. With NeXTmail, NeXT users can send and receive mail from any other UNIX-based computer or any PC, Macintosh, mainframe, or minicomputer that uses SMTP as its mail protocol.

If you are exchanging e-mail solely between NeXTs, you can send multimedia mail, with italics and bold in the text, as well as file and picture attachments. But if you want to send mail to any other platform, you'll have to stick to plain ASCII text.

Mail connectivity is not limited to LANs: Network users can exchange mail globally by inaugurating a UUCP connection to the Internet (see "Linking Into the Internet," *NeXTWORLD* Fall 1991).

Printing

Printing on a Novell-networked PC printer from your NeXT will require release 3.0 of NeXTstep. Even then, the PC printer must be PostScript. Hewlett-Packard LaserJets, which are common among PC installations, can be retrofitted with PostScript cartridges, though performance suffers. Other types of printers simply cannot be used.

TCP/IP packages allow you to print on a NeXT printer from your PC. If you're running NetWare, you're almost out of luck – even the forthcoming Novell support won't help. However, Microsoft Windows and LaserTools Corporation's Printer Control Panel (formerly Trading Post) allows users to capture print jobs to disk as PostScript files: File transfer can get the file to your NeXT, where Preview can print it on the NeXT laser printer.

Mail

Unlike the UNIX universe, where electronic mail can originate from every computer and SMTP guarantees that it is delivered, the world of PC LANs suffers from a hodgepodge of proprietary e-mail standards. Fortunately, almost all LAN e-mail systems on PCs can be routed to SMTP-based mail systems by way of software-based gateways. Gateways vary in cost and convenience; your PC LAN e-mail vendor can tell you how easy it is to connect to the worldwide UNIX-based mail systems.

Printing

Both NeXT and Macintoshes use PostScript; even though the NeXT printer is a 400-dpi device and Apple LaserWriters print at 300 dpi, PostScript files will print on either without obstacle.

Unfortunately, you can't share one PostScript printer on a NeXT/Mac network without several thousand dollars of add-on hardware. Though a LaserWriter can be used on a NeXT serial port, a NeXT won't find it unless you use an Ethernet-to-LocalTalk gateway plus appropriate software. It may pay to wait; NeXT's forthcoming EtherTalk support will enable NeXTs to talk to PostScript printers connected to Macintoshes.

A practical, if cumbersome, solution to sharing PostScript printers among Macintoshes and NeXTs is to direct a PostScript print job to a disk file. You can use file-transfer or file-sharing software to move the PostScript file between the Mac and NeXT for printing.

Mail

Mail is not standard on every Macintosh. But most Macintosh mail applications, such as CE Software's QuickMail application, Microsoft Mail, and Sitka's InBox Plus, offer optional software gateways to SMTP-based mail systems that enable users to exchange text-based mail.

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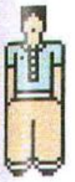


"LA Law" has nothing on Northern States Power. The Minneapolis electric company's legal department is a step ahead in every legal game, thanks to 28 NeXT systems and a case management system custom-designed by Boss Logic of Fairfield, Iowa. The software tracks all legal cases in which the company is involved, providing immediate access to detailed information for the company's attorneys.

"It tracks absolutely everything," says Dorie Kandler, a legal information specialist. "It will be used by management so they can tap in and say 'What's happening with this case? Has it been settled? Is it open? When is the date it happened? What is the status on the case?' " The attorneys also will be able to use this information as background and reference for other cases, retrieving the data for themselves, she adds.

This is the type of application that NeXT has in mind when the company talks about interpersonal computing (IPC) – people sharing data and ideas over networked workstations. NeXT has promoted IPC as a key advantage of its technology because the combination of multitasking, interapplication communication, and interface consistency offered in NeXT computers is ideal for sharing data across applications and across networks.

With NeXT's tools in place, the key ingredient in IPC is a new class of software that facilitates group interaction. The precise nature of the software – what's been called "groupware" on PCs – is hard to define because the field is only now being explored. But NeXT users are quickly discovering that the ability to share data, exchange mail, and use software to collaborate in real time has boosted their productivity and changed the way their organizations function.

The beauty of Northern States Power's application, which will be called Boss Law and is now in beta testing, is that it will be able to integrate all of the documents relating to a case. "If we don't have it on-line, we plan on scanning it in or even typing it. Then we can do actual searches through each and every document," says Kandler. ▶

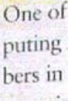
BY SHARON FISHER

ILLUSTRATION BY JOHN CRAIG

SHARING FILES AND FACTS

One of the most basic types of interpersonal computing is managing and sharing files among members in a group. NeXT's folder system makes organizing and sharing documents a breeze.

For example, at Allegheny College in Meadville, Pennsylvania, students and teachers use folders to organize an electronic library of course material, as well as to submit their assignments, explains Joel Smith, director of educational computing and assistant professor of philosophy.



Folders, arranged by course and subject area, contain applications and information relevant to particular assignments. The students save their assignment files in subfolders in their own directories, which only the professor can open. Professors grade the assignments either by inserting comments in a different type font or through an application that allows them to make voice annotations.

One application Smith has developed is called "the library." Students use the system to describe problems they're having; other students are assigned the task of looking through the problems and offering solutions. "The important thing isn't to build up the library as much as it is to go through the process of defining problems and solving them," says Smith. "It's a collaborative learning process."

The William Morris Agency (WMA) in Beverly Hills, California, has set up a series of folders to help users manage both technical and business tasks, says Alex Henry, director of management information services. "We've set up the WMA Library, mounted on every single machine," he says, "which contains all sorts of files that users might need " – how to change passwords, administrative tools, and templates for word-processing files. In addition, certain departments have their own sections within the library, such as a checklist of important steps to follow when completing a deal.

FASTER BY E-MAIL

Electronic mail is an important way for people to work together, sometimes in unexpected ways.

"Last summer, some *Los Angeles Times* reporter had written an article that an agent here thought would make a good movie of the week," Henry recalls. After making a couple of calls to the *Times* without success, the agent put e-mail out to "all" saying, "Anybody know this reporter?"

As it turned out, the WMA's chief financial officer knew a friend of the reporter. "In the past, the agent would have asked two or three agents and never would have made the connection. It wouldn't have occurred to him to ask the CFO."

Electronic mail also makes things happen more quickly, says Henry. For example, if an agent was briefed by Disney on the studio's needs, the agent might make a few calls "but most likely would wait till the weekly staff meeting" before reporting back to Disney. "Now, the agent can send e-mail immediately, and responses could start pouring in that afternoon."

"E-mail has dramatically dropped the amount of paperwork around the company," says Henry. "One of our senior executives has said that e-mail has fostered a much greater sense of teamwork between the New York and Beverly Hills offices."

At Allegheny, both students and faculty make heavy use of the electronic-mail system as well. "We were initially concerned that [computerization] would isolate us from the students, but e-mail has had the opposite impact," Smith says. "Students who would have been shy to come to our offices get to know us through e-mail. "

The ability of NeXTmail to include files and diagrams in electronic mail messages has been an advantage for William Shipley, a Seattle-based consultant. "It's made everything easier. If I want to send a client a resume, I just drop it into NeXTmail and fire it off. With one project, I would send PostScript graphics and show the client what I was thinking about. I'm also including binaries – actual running programs.

GROUP APPLICATIONS

Some NeXT applications let people work together on a single document, drawing, or database at the same time. One such program is Greyboard, a multi-user, network-based white-board simulator available from the NeXT **ftp** archives. "It allows multiple users to interact with the same screen at the same time. It's the first time I've seen that on any computer," says Shipley.

A similar program that works with text documents is Live Wire, produced by Adamation of Oakland, California.

Live Wire users modify a particular portion by highlighting it. "Once you're done with your edit changes, you paste it back, and everyone on the network sees the changes you've made," explains Adamation president Stephan Adams. If any other user tries to gain write access to a section that is being modified, they get an error message.

According to Adams, the program allows users to work on the part of the document in which they specialize and allows changes to be made to documents more quickly without faxing them back and forth. "With this, you can put it up and the editor can make changes and do corrections," Adams

IPC AT NEXT

The most sophisticated user of NeXT-based IPC applications may be NeXT Computer itself. Under the leadership of director Alex Gray, NeXT's Information Services (IS) department has built applications that handle electronic forms for everything from purchase orders to requests for time off; schedule conference rooms; and help Gray manage a network far more complex than the networks of companies ten times NeXT's size. To manage the burgeoning number of NeXTmail mailing lists, Gray's staff wrote AliasManager. Aliases are ways of addressing e-mail to one addressee and have it go to an entire group of people, such as a committee. Instead of burdening the department with requests to create new lists, the application allows employees to create their own. But each list has an expiration date: A week before it is due to expire, AliasManager automatically sends mail to the list's owner with a notification of its impending destruction. If the owner doesn't take action, the list is purged.

Amazingly, that simple program has reduced requests to IS by 50 percent. "There's a theme here. The system automatically maintains itself," says Gray.

NeXT still hasn't come up with a paperless office, but it's getting closer. Using NeXTmail as a starting point, the company has built an internal system for filling out and processing electronic forms. Forms are hidden underneath icons; they're mailed from user to user by electronic mail in much the same way that paper forms are sent around offices with interdepartmental mail. The content of each form is stored in its own file, says Gray, so double-clicking the form's icon pulls up a program that lets requests be made, changed, and authorized.

For example, running the Check Request program creates a window with a form for the user to fill out. When the form is completed, the user

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by Sim

saves the check in a file, then drags the file's icon into a mail message and sends it off for approval. When a manager receives a check request in the mail, he or she approves it by clicking a menu option; the program then asks the manager for a user name and login password. If they're properly entered, the program adds the approval to the form. The files that contain the check information encrypt and run a checksum operation to prevent unauthorized modification, says Gray.

NeXT employees use an IPC program called Room Z to schedule conference rooms. Run Room Z and you'll see a map of the building that you're in; click on a conference room and you'll get a list of meetings scheduled in that room. Room Z knows which conference rooms in NeXT's offices overlook the marina; it can also list all of the rooms that can seat 35 people, have a slide projector, and are available next Thursday afternoon.

Some more-complex applications access the company's database. Who's Who is a corporate roster that shows the face, phone number, title, and other personal data of everybody in the company. A more serious program is SIS, which lets NeXT's sales force tap into the company's Sales Information System database.

Custom IPC applications aren't just fancy demonstrations of the technology, says Gray. They let people inside NeXT get their job done quickly and efficiently, without a lot of administrative overhead. But don't count on these programs getting out of NeXT anytime soon – these are internal applications only. Gray's hope, however, is that ambitious third-party developers will be inspired by NeXT's internal applications to develop their own commercial products.

by Simson L. Garfinkel

says. "You don't have store-and-forward, but a true workgroup. Users work much faster because they don't have the delay of 'let me get back to you on that part.' There are fewer revisions because you're working on the first drafts together. Also, when you're working in the group, you have more cohesiveness because everyone has to work with one another."

SHARED DATA

A basic form of IPC is sharing data across the network. For example, with the Boss Law application, the case management and document management applications are also tied to a contact file, which is like a big Rolodex, says Kandler. "On other systems, it's all separate applications."

William Morris is also developing a common telephone directory, says Henry, putting its clients' photographs, resumes, and credits on-line. Henry says, "Now, we have to call up the client and get the information and picture from them. If it's 5 p.m. in California and the agent is in New York, then we have to wait until the next day."

In this category, Adamation offers Who's Calling?, a relational database with a user-friendly interface that allows users to make queries against the database and retrieve information in the form of graphics, voice, and data. In version 2.0 of the program, database records can include photographs, voice clips, and documents.

This offers two advantages – first, all the different types of data are available in one place. "Everything's retrieved at the same time," Adams says. "It's much faster and much easier." In addition, the variety of data available makes it easier for users to form a more complete picture of the information than if it were simply text.

WHY GO TO WORK AT ALL?

Eventually, IPC capabilities may help companies implement telecommuting – employees using electronic communications equipment to work at home on company computers. Teleconnect from Marble Associates (see the review in this issue) allows remote logging in to a network. Using this tool, users can work with Live Wire remotely, says Adams. "It works just as on a local network."

"It ends up that I don't have to go anywhere anymore," agrees Shipley, who recently accepted a consulting assignment that normally would have required his presence in California. Now he won't need to relocate.

"Three years ago, I couldn't have made that kind of decision. But enough people out there are willing to hire me in Seattle and let me ship them the work. I'm freed up from having to go to an office." ●

SHARON FISHER *is a San Francisco-based free-lance writer specializing in data communications. Her mail addresses is slf@well.sf.ca.us.*

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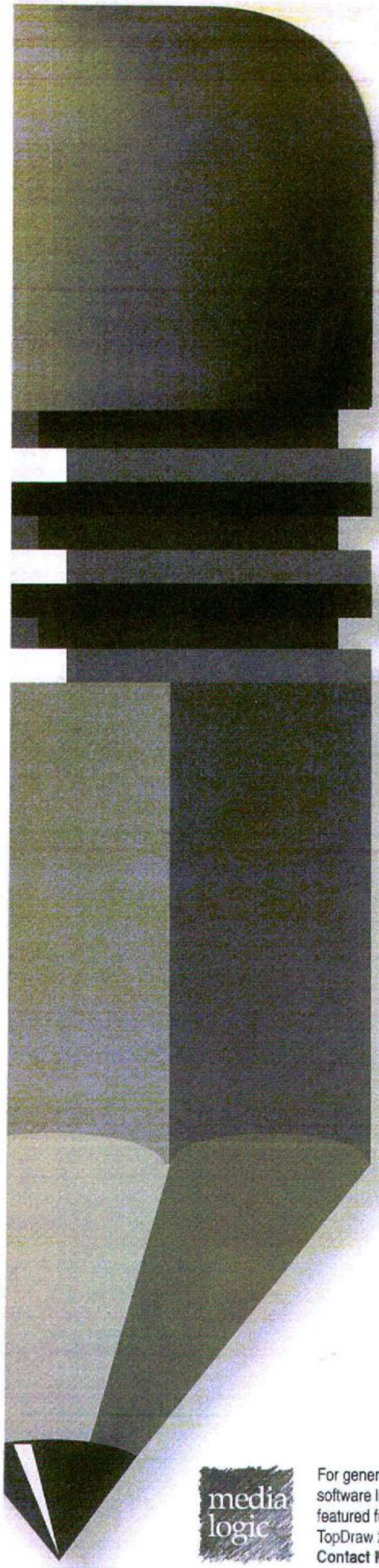

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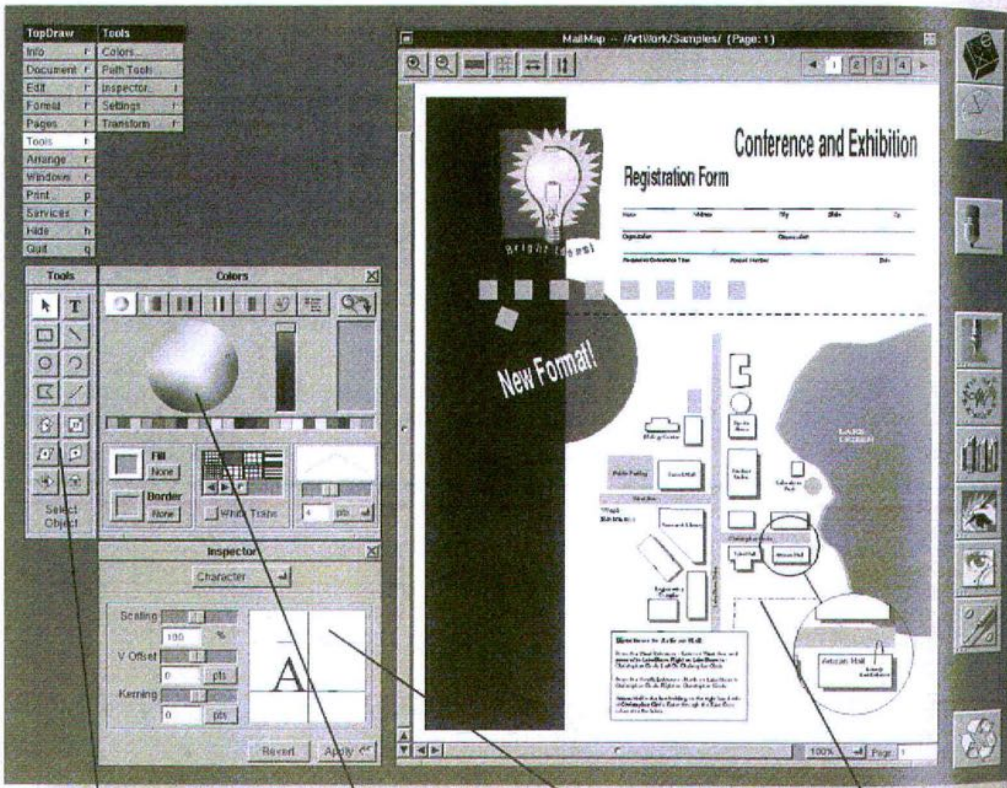
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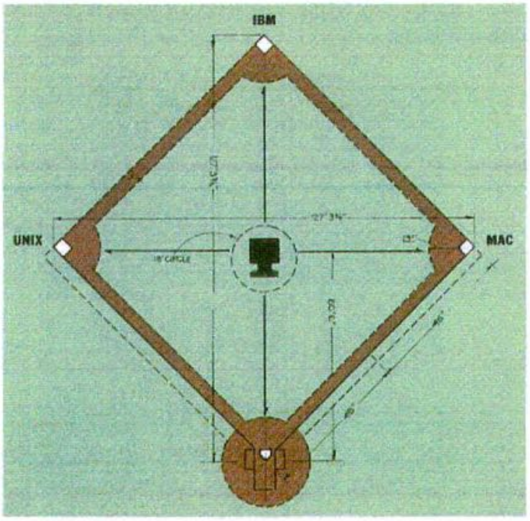
Covering the (Data) Bases

NeXT's forthcoming DBKit will enable point-and-click access to diverse databases.

Database management is probably the central computer application, so the NeXT platform's shortage of usable database tools has long been its most glaring deficiency. Sure, the NeXT has back-end database tools – servers from Sybase and Oracle – costing thousands of dollars and more. But there have been no good tools for using these servers nor any tools for accessing ►



By Simson L. Garfinkel

LLUSTRATION BY DAVE STEVENSON

databases that reside on non-NeXT systems.

All that is about to change. For starters, some third-party database solutions are in the works, including server software from Ingres and a flat file system called Dataphile from Stone Design. NeXT itself plans to include a slick database system, called DBKit, in Version 3.0 of its system software, which will permit in-house developers to create sophisticated front-end applications to interface with database systems on other platforms. With DBKit, NeXT hopes to turn database handling – now a deficit – into a competitive advantage.

DBKit will slash the time users need to develop programs that access information stored on a centralized database, the same way that Interface Builder and Objective C have cut the time to write programs with a hot user interface, says Adam Hertz, who heads NeXT's information architecture group. That's not terribly surprising, since DBKit is based on the same principles of object-oriented programming as the NeXTstep Application Kit.

Clients and servers

Most database systems have several parts:

The database client, or front end, is the part of the database program that most users see. The front end displays the database's entry forms, lets the user perform searches, and generates reports. It typically runs on a personal computer or on a workstation. NeXT's DBKit is designed to make it easier to write front ends.

The database server, or back end, is the program that holds the data. Since it is a very difficult proposition to write a program that stores hundreds of megabytes efficiently, and since a typical database server can support literally hundreds of users simultaneously, database servers tend to be very expensive.

The system is targeted at in-house programmers, system integrators, and VARs who need to write small, custom applications to access large databases. Already, preliminary versions of the system have been shipped to a few select developers.

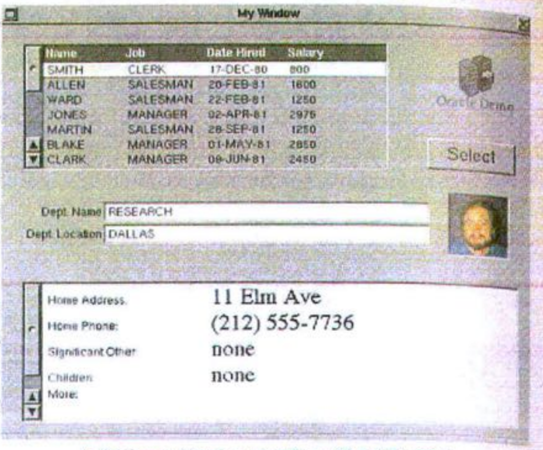
One interface

DBKit lets a person virtually draw a database client application without writing a line of code. Using NeXT's Interface Builder, a programmer can create an empty window and drag in icons, buttons, and data windows from a palette of objects. You specify which fields of the database should be displayed when you connect the icons together. Clicking "Test Interface" makes the application run. For example, in a short period of time a non-expert can build a simple application that allows the user to search a database for a list of employees, click on an employee's name, and then display the employee's image on-screen.

> "With DBKit, we can write applications that are more general than if we had to go down into the lower levels."

"From what little I've seen, it looks as though it's an excellent concept and implementation. It's a lot more thought-out than Apple's Data Access Language (DAL)," says Robert W. Beth, president of a Hawaiian consulting firm that received an early release of DBKit and is developing a database application with it.

Like Apple's DAL, NeXT's DBKit provides transparent access to any database that uses Structured Query Language (SQL). But DBKit also provides a general-purpose framework for accessing any other database, including traditional mainframe systems based on ISAM or KSAM. And it's written so that programmers can develop their own DBKit interfaces to their databases, without the need for hand-holding or proprietary information from NeXT.



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A database retrieval panel written with NeXT's DBKit.

Programmers writing database applications today have the legacy of databases from the past 20 years to work around, Beth explains. But using DBKit, "we are able to write an application that will be far more general than it would be if we had to go down into the lower levels."

DBKit also opens up information sources other than relational databases, says Hertz. For example, the DBKit can access information stored in the NetInfo database or the UNIX file system. Adapters are planned for Digital Librarian, databank services (like Dow Jones News Retrieval), and the Wide Area Information Service project at Thinking Machines Corporation of Cambridge, Massachusetts.

Of course, DBKit's generality comes at a price. By glossing over differences between databases, it also hides each system's strengths. But DBKit means that a program designed to work with one database today will work with another database tomorrow with little or no modification. DBKit should make it easier to adapt an existing application to new environments.

"It is one more incentive that we have for developers to use our platform – they get this database access layer for free," explains Hertz. "It's analogous to the rest of the Application Kit philosophy: You give developers big levers and you don't make them pay."

Three-part harmony

DBKit is divided into three harmonious main parts that complement and strengthen each other but nevertheless remain distinct.

Interface. DBKit's top level, or Interface Layer, is a set of NeXTstep user-interface tools designed for use with NeXT's Interface Builder palette. The most important tool is the database icon, represented by a filing cabinet. The database icon maintains a connection, through the DBKit's lower layers, with a remote database. By sending Objective C messages to the icon, the programmer can perform searches on the database; step sequentially through a group of records; and retrieve, update, and delete information.

Using Interface Builder, the programmer can connect the database icon to other NeXTstep user-interface tools, such as matrices, forms, and cells. When a connection is made, the programmer specifies which field of the database record should be sent to the user-interface object. When the program runs, the data can be automatically brought up on the screen.

Other tools that have been developed for DBKit include a special database browser that displays selected fields from a group of searched-for records, and an image well that displays bit-mapped images. DBKit can also work with Interface Builder palletes offered by third parties – for example, OTPalettes: 2.0, from Objective Technologies, a financial consulting firm in New York.

"We are finally starting to get software ICs," says Beth. The concept of a software integrated circuit, in which programmers working at one company can develop software parts that can then simply be plugged in by programmers at other companies, is one of the central ideas behind Objective C.

Of course, some difficulties have arisen. Interface Builder had to be extended in significant ways to work with DBKit, says Hertz. But what's surprising is how few changes had to be made. "One of the goals of the Interface Layer is to use generic controls for the data display," explains Hertz. In other words, all of the DBKit objects work with the standard NeXTstep user-interface tools.

Access Layer. Underneath the Interface Layer is DBKit's Access Layer. This layer consists of the Objective C classes and methods that an application would communicate with to access data stored in a remote database.

The beauty of the Objective C interface, says Margaret Chan, a NeXT developer advocate, is that it gives programmers a single, unified way of communicating with information sources. "Historically, when developers built a database application, they had to pick a database system and stick with it," says Chan. "This way, they can develop a database application that is portable."

Having a single interface also makes it easier for a programmer to simultaneously access data stored on a variety of servers that have a common interface. "Companies store information in lots of different databases. They also need access to information in third-party services like Dow Jones," says Chan. The single interface means that programmers have less to learn in order to get their jobs done.

Adapters. Of course, some part of DBKit has to be customized for each different database protocol. That part is the DBKit's bottom layer, a set of modules called "database adapters."

We are finally starting to get software integrated circuits, software parts that can simply be plugged into other programs.

A database adapter is a special Objective C class that connects the DBKit with specific databases. When DBKit's Access Layer wants to log on to a remote database, it sends a message to the database adapter that performs the log-on sequence. Other (documented) protocols implement the four basic verbs of SQL (select, insert, update, and delete), as well as a data dictionary protocol that lets the Access Layer determine what kinds of data elements are stored in the remote database. The adapter manages the connection between the DBKit and the database server. It also translates the DBKit commands into the instructions required by that server.

Because the interface between the Access Layer and the database adaptor is documented and well defined, developers can write their own adapters if none exist for a particular database. "It's really not that difficult to do," says Chan, adding that one company developed the adapter for a relational database system in less than two weeks. NeXT is now actively recruiting companies to write adapters for DB2 and IMS, two databases common on large mainframes.

Is it enough?

Steve Zalewski, director of the UNIX Products Division at Oracle, NeXT's neighbor in Redwood City, is excited about DBKit – but with reservations.

"This is certainly an advantage for developers," says Zalewski. "It is consistent with a lot of things being done in the industry right now."

Indeed, says Zalewski, the idea of having a common protocol for communicating between an application program and an SQL database is a primary goal of the SQL Access Group, a trade organization that counts both Oracle and Sybase among its members. "I think it is clear that [most companies] want to offer programmers a common interface for a choice of databases."

But Zalewski wonders whether DBKit will be so general-purpose that it will be less useful for people doing demanding jobs requiring relational database access: "The problem with having any kind of standard interface is you have to make tradeoffs. There is clearly an advantage to programmers in being able to access the widest range of databases. But whenever you make an engineering tradeoff, you give something up. Because you are [broadening] what you can access, you don't know what you are accessing. You don't know that it is a relational database and that you can use relational commands in there."

There are also some other unresolved issues with the current state of the technology. For now, DBKit doesn't let the programmer create or modify database structures except by explicitly sending SQL directly to the database server. Another needed feature, says Hertz, is a way to publish a list of databases available to the user.

The problems should be addressed before NeXT releases NeXTstep version 3.0 in 1992. When it does, NeXT will not only have covered its (data) bases, it will have added a powerful new tool to its kit bag of competitive advantages. ◆

SIMSON L. GARFINKEL *is a senior editor at* NeXTWORLD.

Buyer's Guide

Dataphile

$495. Stone Design Corporation, 2425 Teodoro, NW, Albuquerque, NM 87107. 505/345-4800, 505/345-3424 fax

Ingres

Price varies. Ingres Corporation, 1080 Marina Village Parkway, Alameda, CA 94501-1041. 415/769-1400; 800/446-4737; 415/748-2545 fax

Oracle Relational Database

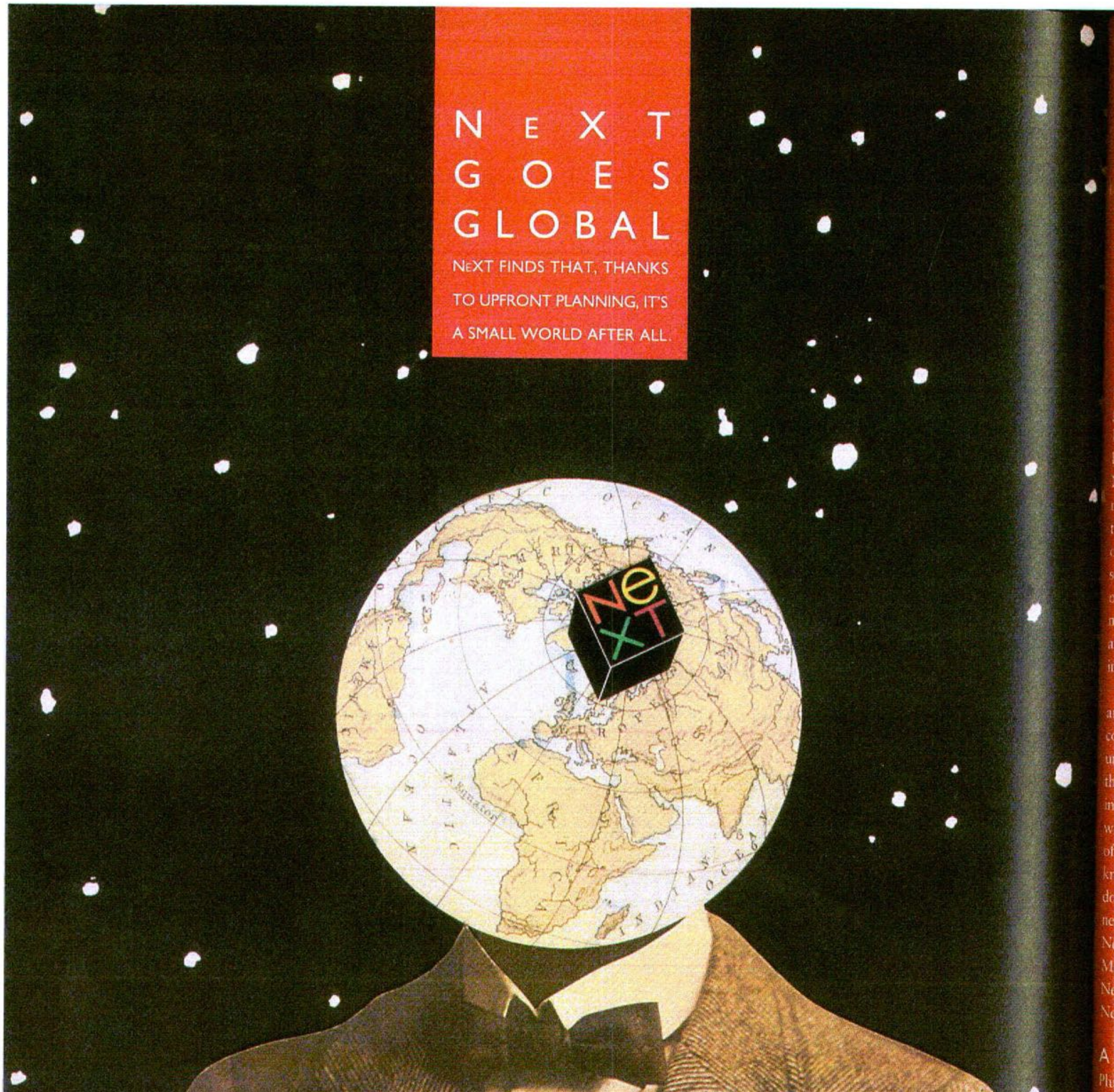
$5100 for entry-level, single-user server. Oracle Corporation, 20 Davis Dr., Belmont, CA 94002. 415/506-7000; 800/345-3267

Sybase SQL Server

$595 for limited server (five connections; developers only); $3500 for unlimited server for one user, $16,500 for an unlimited number of users. Sybase, 6475 Christie Ave., Emeryville, CA 94608. 415/596-3500, 800/879-2273, 415/596-4508 fax

NeXT GOES GLOBAL

NeXT FINDS THAT, THANKS TO UPFRONT PLANNING, IT'S A SMALL WORLD AFTER ALL.



BY DAN LAVIN

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In Lisbon, a physics professor does cutting-edge physics in real time. In Helsinki, music wafts out of speakers connected to a slab. In Tokyo, an analyst builds a model in Improv using Japanese characters. NeXT has gone global – and with a vengeance.

Many factors have combined to make NeXT's international prospects strong, and they're growing stronger. Hard lessons learned at Apple and a changing high-tech market persuaded NeXT's founders to keep the international market in sight at all times, and that foresight is paying off. Almost half of NeXT's second-quarter 1991 sales were overseas, and NeXT projects that non-U.S. markets will account for an even greater percentage of sales in the future.

The needs of NeXT's markets around the world overlap and converge in both expected and unexpected ways. The sidebars to this article introduce some of our international correspondents, who will also contribute to future issues of *NeXTWORLD*, letting us know what their countrymen are doing with the NeXT, what they need from the computer, and how NeXT is addressing their concerns. Meantime, here's an overview of NeXT's global market and NeXT's activities in it.

A UNIVERSAL POWER

Plug a NeXTcube into almost any outlet anywhere in the world, and you're in business; the local voltage is automatically supported. This type of detail is small but significant, illustrating the importance NeXT places on international compatibility, and how central a place that concern has in the design process.

During the past ten years, as overseas markets for high-tech products have begun to flower, computer hardware and software companies have been scrambling to move into them. With that experience behind them (many of NeXT's people did their scrambling at Apple), and with an eye to the opportunities ahead, NeXT's designers made sure that international issues were kept firmly in mind.

To meet this goal, NeXT decided that it was important to have just one product to sell all around the world. In this way, NeXT could enter new markets with minimal expense and serve a broad variety of markets.

Special care was taken to make the machine easily acceptable to foreign regulators, leaping over hurdles that have left other computers rotting on the docks of Europe and stalled in the customs warehouses of Japan. This meant paying attention to U.S. technology-export restrictions, building a magnesium shell to shield radio interference, and other measures. While universal components come at a premium, NeXT is banking on the theory that, over time, economies of scale in manufacturing and shipping will offset up-front costs.

The advantages of the approach are illustrated by the NeXT's packaging. Every NeXT computer ships in three boxes: one for the MegaPixel monitor, one for the CPU, and one for the Starting Point Kit. Only one of these, the Starting Point Kit, contains materials that need to be localized for overseas users – the keyboard (customized for the characters and accent marks for English, French, German, Spanish, and Japanese), the power cord (with the correct prong configuration for local sockets), and the software license and user documentation (translated into the appropriate language

ILLUSTRATION BY MALCOLM TARLOFSKY

SWITZERLAND

SWISS WATCH

Florian Gutzwiller
Swiss NeXT User Group
e-mail: snug@open.ch

The Swiss are a little bit cramped in dealing with high tech. In the United States, high tech is a part of everybody's life. Here in Basel, a city with 203,915 inhabitants, people are still waiting for cable TV, and every fax machine or microwave oven has some magic in it.

The most recent NeXT presentation, at the local PC user group, was like a circus. The numerous Word for Windows users got very nervous when they saw how I was dragging 1.5MB color PostScript files into WordPerfect documents and aligning text around them. When I ran Mandelbrot and Molecule side by side on the 4-by-4-foot RGB projector, a loud murmur went through the audience as if I were making a handstand and spitting fire.

NeXT has sold about 500 machines in Switzerland. User-group activity is just beginning, but Switzerland's small size (300 miles from one end to the other) is in its favor: Active know-how transfer is already under way, with e-mail a key factor. We are just about to network all the NeXT users in our area.

Internationalization is the big topic for us. NeXTstep 2.1 supports the Swiss German keyboard, but Lotus Improv and other applications just ignore it. Software manufacturers should take five minutes to think about the NeXT users beyond the U.S. border. NeXT should also give attention to its German version of the operating system. We don't want German menus, but German spelling checkers would be nice; a German dictionary should be included for free.

JAPAN

RISING SUN

Arthur C. Kyle
Canon, Japan
akyle@cpu.canon.co

Canon, NeXT's partner in Asia, finished the Japanese version of the operating system in May, and system upgrades, complete with Japanese language user manuals, are making their way to users throughout the islands. Canon claims that about 1000 of the '030 machines are in Asia (mostly in Japan), and NeXT claims close to 1300 CPUs shipped to Canon in the first quarter of 1991. But most people are still waiting to see real Japanese-language support before they buy. So far, customers tend to be software developers interested in what might be coming next, as well as technical and research labs and universities. There have also been sales in the financial market.

Canon's expansion of its distribution channel in Japan to include Canon Sales (a major distributor of the Macintosh) will give the NeXT machine needed exposure, but it remains to be seen how much energy Canon Sales will devote to the machine. Tech support and software and peripheral sales are also major requirements.

No list of woes would be complete without laments over the price of the NeXT machine in Japan. Canon has set the price for a basic 8/105 monochrome NeXTstation with the Japanese OS at ¥1,280,000, more than US$9000. Why so high?

Despite obstacles, the potential for the NeXT in Japan is high. Canon is actively courting U.S. developers to localize their apps, and a number of commercial packages from Japanese developers are in solid beta and should be out by the fourth quarter of 1991.

and taking into account local regulations).

This modular approach makes it possible for NeXT to use one manufacturing and packaging line for the hardware on every computer it ships. It also enables NeXT to entrust localization efforts to local distributors – the Kanji keyboard, for example, is available only through Canon, NeXT's Japanese distributor. This is an advantage both to NeXT and to local resellers, who can take control of their own markets without waiting for NeXT to target it.

THE LOCAL LINGO

A shipping copy of Improv is pulled out of the box, loaded on a Japan-localized NeXT, and it is running in Japanese, even though Improv was completed long before System 2.1J (the Japanese version of NeXTstep) was even in alpha. This is no accident: Every element of NeXTstep is designed to be fully international.

Display PostScript's appropriateness for internationalization was an important part of NeXT's decision to use it on its machines. Unlike character-based systems, which depend on ASCII codes to signal letters of an alphabet, Display PostScript treats every character as a graphic representation, whether it's an English character, a Japanese ideogram, or a picture of an hand using international sign language. Low-level system software accepts international character sets and keyboards, and new keyboard and font definitions can be dropped into special system folders at will. Then, end users simply select the language they prefer using from the NeXTstep Preferences panel. This cuts the time it takes to create a foreign edition of software from years on any other platform to weeks on the NeXT.

The last element in NeXT's international plans is its icon-based interface, designed for international communication.

SELLING ABROAD

NeXT's overseas marketing is as focused as its product strategy. Target markets are carefully selected – and then subjected to a minutely orchestrated sales campaign which is based on key local partnerships.

The first step is selecting local partners. They must be motivated, well-capitalized, a major force in the local market, and willing to commit significant resources – in Europe, resellers must commit to a $1 million investment in infrastructure (such as training and facilities), exclusive of inventory, in order to qualify. One hundred of these NeXT Centers are already in operation. With the partner, the local NeXT office creates an advertising and marketing program that includes training programs for users and dealers. Then NeXT recruits local developers and creates service centers.

For the present, NeXT has chosen just two major markets in which to sell: Western Europe and the Pacific Rim. (Canada is covered by the domestic sales force.) Unfortunately, this leaves other major markets clamoring for machines. According to Max Henry, NeXT's vice president of Pacific Operations and former head of developer partnerships in Redwood City, California, "NeXT feels it's very important to do the right thing in the markets it serves, therefore we prepare carefully and makes sure we have all the essential pieces in place before entering the market. Therefore it's better to have no machines at all than to have machines poorly supported in a market."

NeXT Europe's offices, soon

FRANCE

BON VIEUX NeXT

Thierry Charles
*NeXT Developer #2138, **President** FaNG*
e-mail: charles@crim.fr

NeXT's relationship with France began in 1987, when Jean-Marie Hullot arrived in California. He had created a program named SOS Interface, written in Lisp for the Macintosh. When it was demoed for Steve Jobs, he said, "We want this on our machine." NeXT bought the rights and turned it into Interface Builder.

A national user group (FaNG) was co-founded by NeXT developers Michel Coste and Hullot. The user group publishes a quarterly newsletter, *Inspector*. The first official NeXT event in France, in November 1990, was orchestrated by Hullot for 500 developers interested in NeXT. More than 100 developers are now registered.

NeXT Computer France, founded in December 1990, has created a network of about 30 NeXT resellers and VARs throughout the country. The first one, located in Lyon, is aptly named "El Camino Real."

Since the end of April, NeXT computers have begun to sell. Large companies and government organizations are buying them – Electricité de France, the nationwide electrical utility; France Telecom, which provides all telecommunications, telephone, and databank services in France; and universities in Paris, Lyon, Montpellier, and Nice are among major customers.

NeXT in France also means NeXT Europe, which moved its headquarters to Antibes, near Nice, in July. Now a significant part of Hullot's developer team is coming to work in France.

AUSTRALIA

NeXTS OUT BACK

Cameron Bromley
*OzNeXT, **the Australian** NeXT Users Group*
e-mail: cdb@codex.oz.au

Australia has – at most – 20 NeXT machines in the country, all smuggled in from abroad. Australia, like many other countries, has no NeXT distributor. It seems that the NeXT deal with Canon for distribution in Southeast Asia specifically excluded Australia. The result is that it is impossible to buy a NeXT machine in Australia.

Since Australia has a global share of about one percent of the world computer hardware and software markets, it's hardly surprising that Australia is not at the forefront of NeXT's marketing efforts. But Australia is often used by large companies as a testing area for new products. Has anybody in the States heard of the IBM JX personal computer? It was released here in 1985 to gauge market reaction and never made it to the real world.

The good news is that the machines that are here are supported very well, albeit informally, through OzNeXT. And those with "official" machines, such as Codex Software Development, have good direct NeXT tech support through e-mail. And, of course, Internet makes the world small. There are persistent rumors that NeXT will do something here Real Soon Now. NeXT machines are currently in use for a wide variety of tasks, ranging from simple word processing to UNIX/BSD development platforms, proprietary production systems, and arcane (but fun) fractal landscape-generation applications.

moving from Geneva, Switzerland, to Antibes, in the south of France, is headed by Theo Wegbrans, who previously headed up Hewlett-Packard's European operations. Since the European sales office was set up last year, NeXT's sales in the area have grown to account for up to 30 percent of total sales.

Wegbrans attributes NeXT's success in Europe to several factors, but key among them are the NeXT's UNIX operating system (attractive to Europeans who have been burned by past reliance on proprietary operating systems) and the fact that high-tech sales in Europe have been necessarily VAR-based from the start, due to a dearth of attention from computer manufacturers themselves. This created a large pool of dealers with extensive infrastructure in place, and the dealers, in the business of creating custom systems for their clients, were drawn to the NeXT's unique development environment.

NeXT's partner in Japan and Asia is Canon, which owns 16 percent of NeXT and is a well-established presence in the notoriously hard-to-crack Japanese market. Its sales branch, Canon Sales, is the largest computer distribution network in Japan. The top 200 of the 2000 Canon stores currently carry NeXT.

NeXT has important advantages over any other system for Japanese buyers. Perhaps the most important is NeXTstep 2.1J. This Japanese version of NeXTstep, released in May of this year, was the product of a joint development effort by NeXT and Canon that provides an innovative, unique answer to data-entry problems, posed by the large Japanese character set, that have stymied automation in Japan. A special text object in 2.1J provides on-the-fly Kanji-to-Kana translation (Kana is a phonetic version of Kanji developed to enable the entry of Japanese characters on reasonably sized keyboards). Unlike other Kana systems, 2.1J makes it possible to type directly into a document, bypassing the translation window necessary in less-integrated Kana-Kanji systems.

Another key advantage is Display PostScript. Character-based displays, such as those used by the Macintosh and X Window workstations, require the computer to store a bit map of each character in each size that you want to display – a real hardship, given the immense number of Japanese characters. Thanks to Display PostScript, the NeXT can store a single representation of each character. Then, the 400-dpi resolution of the NeXT laser printer provides substantial advantages over the standard 300 dpi in imaging the graphic Kanji characters.

The opportunity for NeXT in Japan is vast. In the 1980s Japan automated its factories. Now it is ready for the next wave, computerizing its abacus-dependent back offices. And unlike the United States, the market is wide open, with no established standards.

A NEW WORLD ORDER?

NeXT's careful planning seems to be paying off. One product and a high-tech factory keep costs low. A careful qualification program for new dealers should avoid distribution problems. Relationships with strong local partners makes for localized decision-making and takes the strain off NeXT's own resources. The hallmarks of a successful multinational company – strategic interrelationships, strong products, and competitive prices – seem to be in place. ●

DAN LAVIN *is a senior editor at* NeXTWORLD.

GERMANY

FAIR START

Martin Ortlepp
Hannover NeXT User Group
e-mail: martin@cube.han.de

NeXT entered the German market with its appearance at the CeBIT '91 fair in Hannover. From a small booth, NeXT demonstrated the whole product family, from the monochrome station to the NeXTdimension. On all seven days, the booth was jammed. With 500,000 attendees, the show is the largest in the world, and NeXT's was among the ten most-visited booths.

That was NeXT's first introduction in Germany. Now, four months later, NeXT computers can be found in companies and universities all over the country. Especially in the desktop publishing market, NeXT has become a competitive system.

NeXT's price strategy in Germany could be a problem. NeXT offers a discount of 5 percent for an order of one to nine machines and 10 percent for ten machines and up. This makes it hard for students to purchase NeXT machines, especially if you keep in mind that the prices are higher here than in the United States. There's no doubt that NeXT has the best relation between price and performance, but NeXT sales would be better if there were a slight revision of import pricing politics here.

CANADA

NORTHERN LIGHTS

Robert Lin and William Barr
TAO Newsletter
rlin@cs.ubc.ca

The slow pace at which businesses are beginning to enjoy the NeXT is no fault of NeXT's. Rather, it is the result of confusion in the minds of business executives about the UNIX marketplace and the role of NeXT in that arena.

On the other hand, the Canadian NeXT development community is ambitious and vibrant. Vancouver, British Columbia, is particularly active, with user groups at Simon Fraser University, the University of British Columbia, and the Vancouver NeXT User Society. The prominent Vancouver developer is Microstat Development Corporation, developers of OMEN III, a stock market analysis package.

Canadian universities lead the way in the use of NeXT computers. A group at McGill University in Montreal successfully ported version 4 of X Window to the NeXT. Also under development is a language for algebraic manipulation, called ALDAT. At the University of Alberta, a research group is developing groundbreaking geophysical modeling techniques on a Cube using Mathematica. Tom Poiker, at Simon Fraser University, uses the NeXT to teach mapping. The University of British Columbia just completed its first year of operating a NeXT lab of 40 computers for undergraduates.

Business tends to follow the path opened by universities. If this tradition is followed, the investment NeXT has made in the Canadian academic and software development communities will begin showing dividends in another year.

THE MUSIC BOX

FOR DIGITAL AUDIO, NEXT'S HARDWARE IS SHARP, BUT COMMERCIAL SOFTWARE IS FLAT.

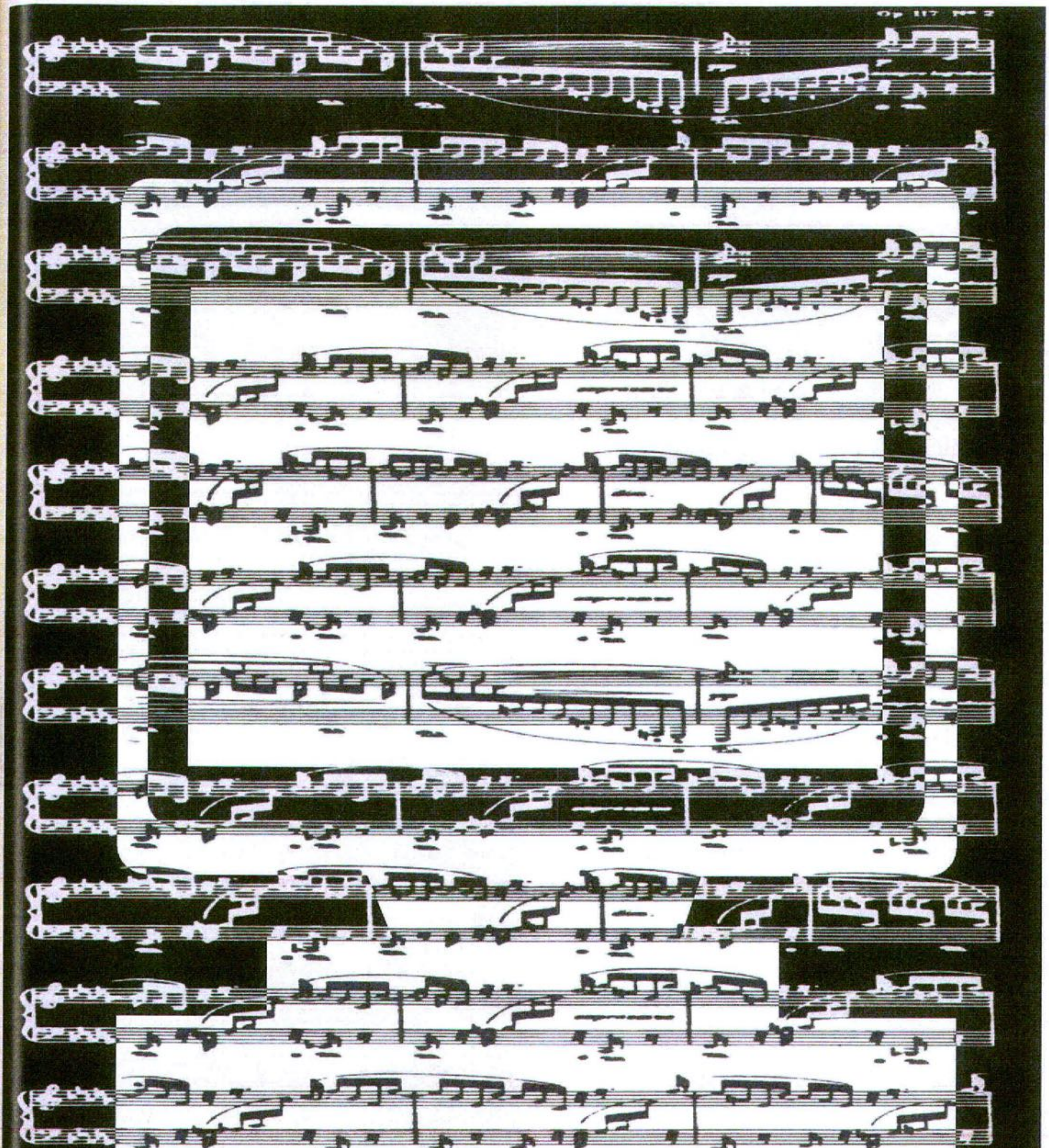
BY LEE SHERMAN

Paul Lansky, professor of music at Princeton University, calls the computer "the instrument of the imagination." A music pioneer from way back, Lansky once spent whole days trying to coax sound out of a mainframe. Now the abstract composer has recently released a CD of his compositions, *Smalltalk*, on New Albion records, the first commercial recording to be created entirely on a NeXT computer.

And if that mainframe was a violin for Lansky, the NeXT is a Stradivarius. With its speed, mass storage options, sound circuitry, and especially the Motorola DSP56001, the NeXT is ideally suited as a computer-based digital audio recording system.

Until the arrival of the NeXTstation, musically capable desktop systems could run as high as $20,000. But the NeXTstation, equipped with a small amount of additional hardware and software, brings CD-quality recording, playback, and mastering to the desktop for about $5000, a price that even a musician can afford.

NeXT's musical ability is limited only by the lack of commercial music applications. Lansky is the type who will do whatever is required – including programming – to get the effects he's after. The same is true for two of his former students, Andy Milburn and Tom Hajdu, now in business as "tomandandy" (see the sidebar "NeXT on MTV"). They find that the NeXT's music programming tools are superior to those available on other desktop platforms. Less hardy souls, however, may be daunted by the shortage of software. ▶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In fact, the NeXT version of WordPerfect does away with the whole idea of "page pre-viewing." You create each page with the confidence that every element is in place, exactly where it will print.

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To add graphics, all you have to do is use the mouse to drop the image file onto the page. Then, if you'd like to move it, you need only to drag the image to its new location on the page—once again, the type automatically rearranges itself.

Of course, it wouldn't be WordPerfect if it weren't WordPerfect to the core. Our NeXT version is compatible with versions running on other platforms, so you can move files easily between all machines.

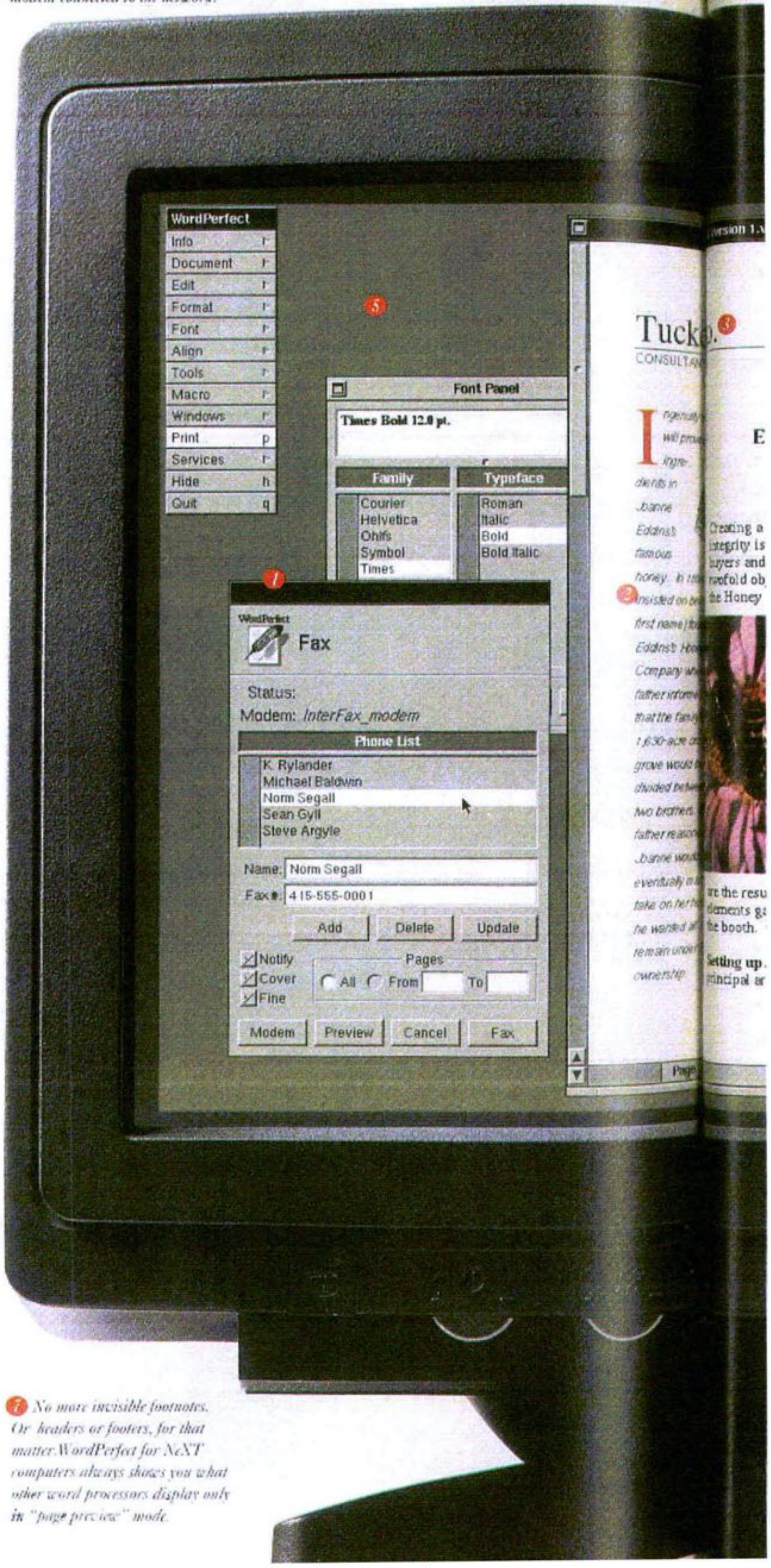
If you'd like more information, just call WordPerfect at (801) 225-5000. We think you'll agree that WordPerfect and NeXT computers represent another leap in word processing. Then again, from what we've seen in the world of NeXT, innovation seems to be the order of the day.

WordPerfect

① *Fax capability is built into every NeXT computer. So you can easily send a document directly from your screen to any fax machine on earth at 200 dpi resolution. All you need is a single fax-modem connected to the network.*

② *Creating columns doesn't require any gymnastics. Just say how many you want and there they are–all easily adjustable for varying widths.*

③ *NeXT machines use Display PostScript to generate the screen image, so fonts are always sharp–no matter what the type size or degree of rotation.*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Fax#: 415-555-0001

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⑦ *No more invisible footnotes. Or headers or footers, for that matter. WordPerfect for NeXT computers always shows you what other word processors display only in "page preview" mode.*

NeXT world, the
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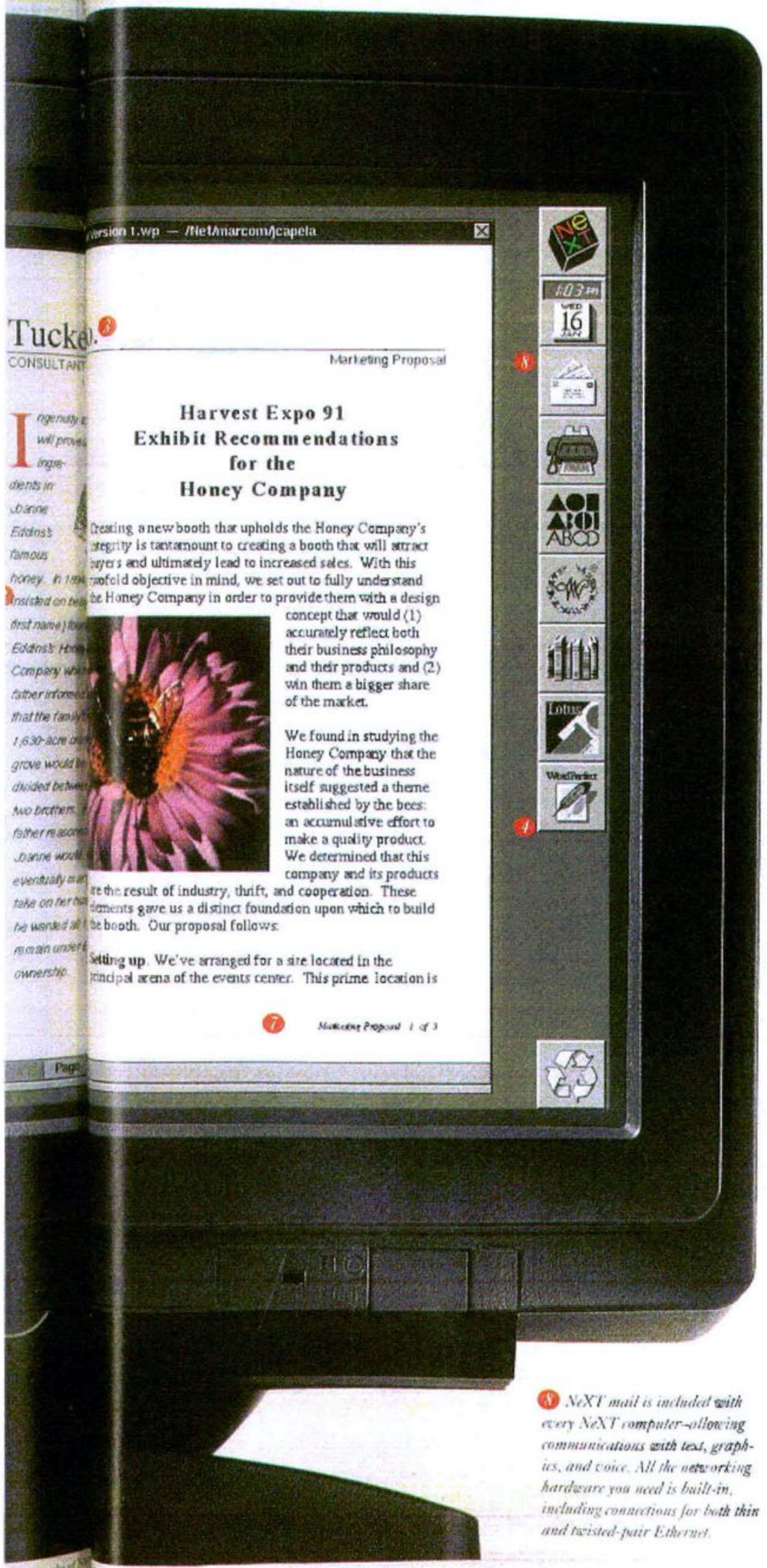
multitasking, you can
them at once–cutting and
as much as you want.

⑤ *The NeXT MegaPixel 17" Color Display gives you an image that's remarkably rich and detailed. It also gives you space to view an entire document and still have room for tools and panels.*

⑥ *To add graphics, just drag an image file onto the page–not only will the image appear, but type automatically rearranges itself. Moving an image is as simple as clicking and dragging.*



Marketing Proposal

Harvest Expo 91
Exhibit Recommendations
for the
Honey Company

reating a new booth that upholds the Honey Company's tegrity is tantamount to creating a booth that will attract uyers and ultimately lead to increased sales. With this wofold objective in mind, we set out to fully understand he Honey Company in order to provide them with a design concept that would (1) accurately reflect both their business philosophy and their products and (2) win them a bigger share of the market.

We found in studying the Honey Company that the nature of the business itself suggested a theme established by the bees: an accumulative effort to make a quality product. We determined that this company and its products re the result of industry, thrift, and cooperation. These ements gave us a distinct foundation upon which to build he booth. Our proposal follows:

etting up. We've arranged for a site located in the rincipal arena of the events center. This prime location is

Marketing Proposal 1 of 3

⑧ *NeXT mail is included with every NeXT computer–allowing communications with text, graphics, and voice. All the networking hardware you need is built-in, including connections for both thin and twisted-pair Ethernet.*

fect is a registered trademark of Wordperfect Corp. PostScript and Display PostScript are registered trademarks of Adobe Systems, Inc.

NeXT ANNOUNCES THE COMPUTER THAT MADE IT POSSIBLE.

As WordPerfect discovered, there is one machine perfect for WYSIWYG word processing: the NeXTstation™ computer.

But the truth is, the NeXTstation is a perfect machine for WYSIWYG anything. Because of the way it's been designed, true WYSIWYG is simply a fact of life.

Every NeXT computer is built upon a unified imaging system—PostScript®—to ensure that what you see on the screen is precisely what you'll seen on paper.

And with Display PostScript® on the ultra-high-resolution MegaPixel Display™ images are rich in detail and paper-crisp. Type remains sharp, no matter what the point size or degree of rotation.

NeXT machines also offer true multitasking, so all your work can flow more smoothly. When creating a document, for example, you can receive an image via NeXTmail™ drag it onto your WordPerfect page, then (using the network fax modem) send the finished document directly from your screen to any fax machine on earth.

As the first computer built to exploit Motorola's revolutionary 68040 chip, the NeXTstation delivers performance that's truly inspiring. And with a price starting at $4995, *Byte Magazine* says it "may now be the industry price/performance leader."

No argument here. Considering this one price includes the display, the keyboard, 8 MB of memory, a 2.88 MB floppy disk drive, a 105 MB hard disk, and both twisted-pair and thin Ethernet. Not to mention NeXTmail—which lets you communicate using text, graphics, and even your voice.

Call 1-800-848-NeXT for our NeXTstation brochure. It marks a new era in computer literature: What You See Is What You Want.

Circle 21 on reader service card

NeXT ON MTV

You don't hear just heavy metal on MTV these days. Since Tom Hajdu and Andy Milburn brought their NeXT-produced musical compositions and programming tools to the cable network, viewers have experienced their intricately textured, often chilling soundscapes accompanying many of MTV's flashy video graphics.

Hajdu and Milburn are partners in tomandandy, an award-winning music production company in New York. Much of their work, which also has appeared in consumer product advertising, is created with tools they've written for the NeXT.

"The NeXT is suited to our sort of crazy, programming-intensive world of creating music, which requires a powerful, flexible, and totally open-ended environment," explains Milburn. "This is a very cool way to make and mix a big stew of sounds."

One of the applications, Clamshoe, uses similar algorithms in an attempt to mimic an existing piece of music. "It fails miserably," says Milburn. "It's a real opportunity to change your relationship to what it is that your making and to stumble across stuff that you and your personal habits would keep you from coming across otherwise."

Another program, Squid, digs through the many hours of sound resident on the computer at any given time, attempting to create a new composition based on artificial-intelligence pattern-matching algorithms. The user can adjust sliders to try to influence the outcome of the program, but again the controls are at best vague and purposely counterintuitive.

tomandandy *uses the NeXT to create cutting-edge audio effects.*

Hajdu and Milburn first collaborated in 1986 while graduate students of composition at Princeton University, where they first began to develop the electronic soundbites that have become their trademark.

"We discovered our pieces were getting extremely small, extending from about 8 to 20 seconds in length," says Milburn.

"Somehow it seemed inappropriate to do 25-minute epic works when what we wanted to say could be said in ten seconds," explains Hajdu. "Instead of generating a long, overarching narrative composition, the sound we made was a blast of experience."

Armed with a recorded compilation of 15-second pieces and a plan, Hajdu and Milburn went to MTV headquarters. "We thought the pieces would work really well as scores exploding beneath the MTV logo. It's fifteen seconds long and has a constant influx of weird, racy computer graphics, but always uses the slash rock guitar thing underneath it," says Milburn.

At first, MTV's promotions department was somewhat bewildered, but they soon found a use for tomandandy's work. "They gave us a big pile of records for soon-to-be-released videos and asked us to cut them up and do something unusual for a promotional spot," explains Milburn. The result was BUZZ, MTV's cutting-edge video series of 13 half-hour segments.

Following that initial break, Hajdu and Milburn have won a Broadcasting Design Award for their score of an MTV video package promoting global music and scored numerous commercials, including works for Converse All-Stars, Mercedes-Benz, Sony, and Fujicolor.

While crediting the NeXT for the flexibility necessary to prod their creativity, the two admit some frustration at the lack of professional-level commercial software for the platform. "We have to use rather primitive, almost hilarious methods when we apply sound to film," says Milburn. Because SMPTE doesn't figure into the NeXT universe yet, Hajdu and Milburn describe their synching system as "watching the video and hitting Go."

"In some ways, what we do is actually more difficult on the NeXT platform," says Milburn. "Few sound applications are available, so composers are forced to develop their own programs." Hajdu concludes with guarded optimism: "NeXT was smart enough to make the machines and hopefully to engage the right people [to provide software for] them."

"Our music is conceived in very visual ways and tends to be kind of frightening, a little too scary for most mainstream television," says Milburn, "but it marries well to twisted, chaotic video."

BY LEE SHERMAN AND
CATHERINE PAVLOV

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TAKING MUSIC SERIOUSLY

The Macintosh and Amiga computers have become standards in the music community. Both machines come equipped with sound chips capable of acting as four-voice synthesizers, while the Amiga also offers multitasking. Such sound support has been the best available at an affordable price, and because of that, a wide range of commercial applications have been built around these two platforms. However, according to Lansky those computers are not up to the standards of professional use.

"NeXT was the first computer to take sound seriously," says Lansky. "The Mac and the Amiga both had 8-bit digital-to-analog (D/A) convertors, which gives you a decibel range of around 48 db – about what you get on an average cassette deck. The NeXT has 16-bit D/A convertors for a decibel range of about 90 db, the same as a CD player. Using the other machines was like painting in black and white instead of color."

Providing better sound quality was an obvious, evolutionary step. But including building blocks for music applications, such as NeXT's bundled Sound Kit and Music Kit, was revolutionary. NeXTstep supplies tools for musical synthesis, composition, and performance, as well as the recording, playback, and editing of sound. Like all of NeXT's development tools, these provide objects that make software development easy and ensure consistent interfaces.

What the NeXT doesn't offer – yet – are commercial-level hooks into MIDI (Musical Instrument Digital Interface), the standard around which digital music has taken shape. While MIDI devices can hook into the NeXT through its serial port via a separate MIDI interface, it lacks a real MIDI port – a feature found even in the entry-level Atari ST.

The NeXT's operating system includes a MIDI driver (the version in NeXTstep Release 2.0 replaces a flawed implementation in the first release) and a MIDI object that can be used to communicate with a MIDI synthesizer through the computer's serial port. Any MIDI interface that conforms to the RS-232 or RS-423 standards (including Opcode's Studio 3, developed for the Macintosh) should work with the '040 NeXT machines.

The other drawback is the lack of commercial software applications for music. Previously announced projects, such as the MIDI editors MusicProse and Performer, have been put on hold. For right now, musicians must also become programmers in order to use the NeXT.

The first glimmerings of commercial music software can be seen in multimedia authoring environments with advanced music capabilities, such as MediaStation from Imagine, which includes sound recording and editing capabilities designed for synchronizing sound with other multimedia events. First Chair, due from Imagine next year, is expected to combine similar support for sound with MIDI sequencing. HyperCube, a HyperCard-like tool expected this winter from Thoughtful Software, will include MIDI support.

While ready-made MIDI products for the NeXT are scarce, some gaps are filled and some interesting examples are provided by the developer demos that come with the NeXTstep operating system. One of these, Ensemble, provides an especially able example of the type of functionality available through the Music Kit. Ensemble combines tools for real-time digital synthesis, algorithmic composition, and MIDI playback and recording.

Ensemble is designed to be controlled through an external MIDI device, such as an external keyboard or sequencer. It enables a performer to manipulate MIDI input in real time, adjust instrument parameters, and save the new orchestration to disk. It also includes a variety of algorithms for generating automatic music, similar to those found in commercial applications such as M for the Mac and Atari and MusicMouse for the Mac. It also is one of the few applications available for the NeXT that reads and writes standard MIDI files, which makes it possible to use Ensemble as a simple sequencer.

Another demo, ScorePlayer, is similar to programs like ConcertWare for the Mac, which synthesize music in real time through the use of a score file. In contrast to the relatively crude four-voice synthesizers common on other machines, the NeXT's DSP produces music that is astonishingly rich. The NeXT also features a command-line utility, called convertscore, that lets you convert standard MIDI files into score files that can be used with ScorePlayer or a similar program.

NOISE FROM OUTSIDE

The NeXT includes direct support for two sampling rates: 22.05KHz and 44.1KHz. The circuitry that processes all sound-related I/O is in the MegaPixel Display or, in color systems, in the Sound Box. The video cable transfers sound information from the motherboard to a 16-bit, 2-channel D/A convertor that translates the information into audible stereo sound. The system also includes an 8KHz CODEC chip for analog-to-digital (A/D) conversion.

If your system has a microphone (either the built-in one on the newer machines or one purchased for an older cube), you can use SoundPlayer to record telephone-quality, 22.05KHz sound, but musicians will want something better.

Digital Ears from Metaresearch allows you to record CD-quality audio directly to disk. It plugs directly into the NeXT's DSP port. Digital Ears includes its own software, an easy-to-use program called SoundWorks, for editing and applying effects to your samples. Professional musicians will miss the lack of support for MIDI and SMPTE, but SoundWorks provides most of the tools required for sculpting sound.

Ariel Corporation's DM-N Digital Microphone takes a slightly different approach. It puts a pair of 16-bit A/D convertors inside a microphone, allowing the user to record at a variety of sampling rates, including 5.5125, 11.025, 22.05, 44.1, and 88.2KHz. It also includes inputs for recording from external analog sources. No software is included with the digitizer, but you can use it with SoundWorks, which can be purchased separately from Metaresearch.

In order to synthesize, process, and mix sounds simultaneously, musicians need multiprocessing systems. For such applications, Ariel's QuintProcessor combines five Motorola 56001 chips on a single board that installs into a NeXTBus slot on a NeXT cube. One of the processors serves as the communication hub for the board.

The A/D64x from Singular Solutions extends the signal-processing capabilities of the NeXT by allowing simultaneous A/D input (with sampling rates of 32, 44.1, and 48KHz) and digital output. Like Digital Ears, the A/D64x connects to the DSP port and comes with software for recording, playback, and editing of waveforms.

Dazzl, a manufacturer of high-end A/D convertors used in data acquisition, is making its first foray into the music world with the Zydeco Audio Board, a multichannel digital audio processor

THE NEXT'S SOUND KIT

Motorola 56001 DSP provides real time digital synthesis of sound and music.

Built-in CODEC microphone and analog-to-digital converter allows for voice quality recording at 22KHz.

CD-quality stereo output (44.1KHz, 16-bit two-channel digital audio).

Built-in speaker, stereo headphone jack and line-out jacks for connecting to an audio system.

Unified PostScript imaging system for publishable quality sheet music.

Mass-storage options such as large capacity hard disks and removable optical disks ease the pain of storing large samples.

Bundled software includes several fully functional demo applications that include an anoscilloscope and spectrum analyzer.

The Sound Kit, a set of software routines included in the object-oriented

NeXTstep development environment that provides all you need to record, edit, and playback sampled sound.

The Music Kit, more routines for synthesizing sounds, composing, and performing music.

GLOSSARY

DSP Digital Signal Processor, a specialized computer chip that is capable of performing real-time music synthesis and producing CD-quality audio.

MIDI Musical Instrument Digital Interface, a device-independent language, understood by MIDI-equipped devices like synthesizers, sequencers, and drum machines, which allows them to communicate both with each other and with computers.

MIDI Driver System-level software, similar to a printer driver that provides for communication between the operating system and an external MIDI device.

Sampler A hardware device that converts analog sound into digital sound, making it suitable for manipulation within a computer.

Score file A file containing a representation of the notes in a piece, along with information about pitch, frequency, and tempo.

Sequencer Hardware or software that records the "events" of a musical performance rather than the actual sounds produced.

SMPTE A time-code standard developed by the Society of Motion Picture and Television Engineers that allows for precise synchronization between a sequencer and a tape recorder.

Synthesizer A hardware device that uses internal sound circuitry to create sounds.

with on-board sequencing that could replace dedicated computer synthesizers. The low-end model can sample eight channels at 44.1KHz or four channels at 88.2KHz and takes advantage of the NeXTcube's on-board D/A convertor. The board will soon also be available in a high-end configuration that will add additional channels, as well as tools for manipulating the characteristics of the sound, such as real-time parametric equalization, non-destructive editing, and programmable digital filtering.

BEYOND MIDI

Although discussions of electronic music tend to center on MIDI, it's important to remember that MIDI operates within just one part of the world of electronic music: computer control of external instruments. But the capabilities of the NeXT have the potential to take it far beyond a role as controller and into competition with synthesizers themselves.

"I think what you're going to see in the next five years is machines like the NeXT machine emulating any synthesizer on the market," says Lansky. "Synthesizers will be obsolete; you'll be able to do everything in software."

The NeXT's DSP, which can synthesize music on the fly, and the NeXT's ability to handle an unlimited number of events and channels ensure that the NeXT is well positioned to take advantage of the next wave in electronic music. And as the realms of commercial and electronic music increasingly overlap, that moves the NeXT practically into the mainstream. ◆

LEE SHERMAN *is a writer and NeXT developer specializing in music and multimedia.*

BUYER'S GUIDE

A/D64x
$1295. Singular Solutions, 959 E. Colorado Blvd., Pasadena, CA 91106. 818/792-9567

Digital Ears and SoundWorks
$795; $395 for SoundWorks separately. Metaresearch, 516 S.E. Morrison St., Ste. M1, Portland, OR 97214. 503/238-5728

DM-N Digital Microphone and QuintProcessor
Digital Microphone $595, Quint Processor $700. Ariel Corporation, 433 River Rd., Highland Park, NJ 08904. 908/249-2900; 908/249-2123 fax

HyperCube
$495. Thoughtful Software, 616 E. Locust St., Fort Collins, CO 80524. 303/221-4596

MediaStation
$995 for single user; $3999 for up to 5 users; $11,999 for up to 20 users. Imagine, 32 N. Washington St. #14, Ypsilanti, MI 48197. 313/487-7117; 313/487-1323 fax

Smalltalk
$15 (CD only). New Albion Records, 584 Castro St. #515, San Francisco, CA 94114. 415/621-5757; 415/621-4711 fax

Zydeco Audio Board
$5000 for Zydeco I; $9000 for Zydeco II. Dazzl, 1203 N. Bourland Ave., Peoria, IL 61606. 309/674-9317; 309/674-9122 fax

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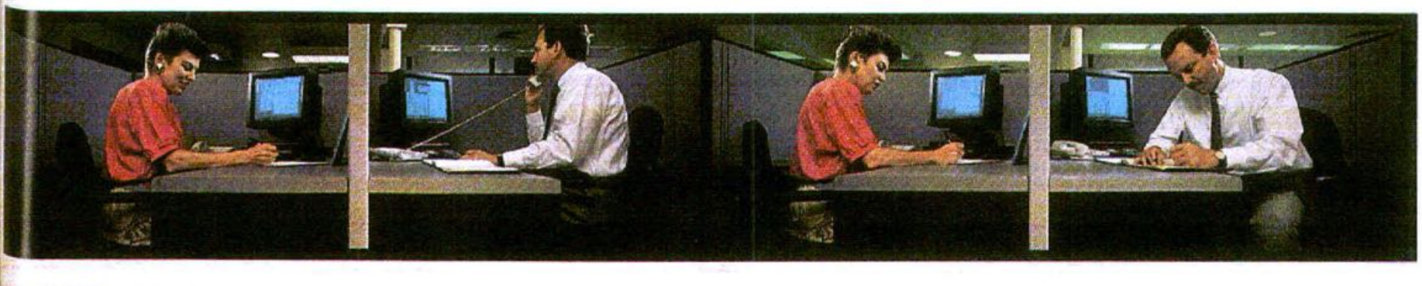
FAST SELL

REAL TIME CASE STUDY

UPSTART REALTOR GOES UPSCALE WITH BIG NeXT PLANS.

BY JONATHAN LITTMAN



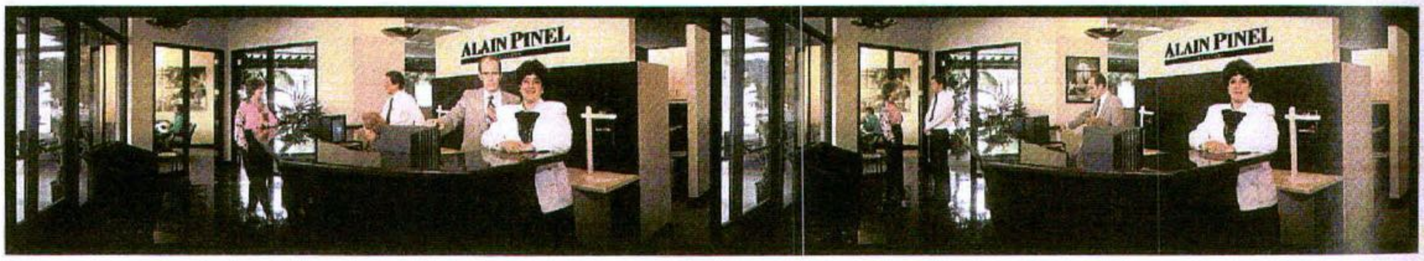
HOTOGRAPHY BY MARK TUSCHMAN

Pastorino wasn't impressed with most of the computer systems. "There was no emotion. It was like going out and getting your tires rotated."

Breaking into the lucrative and competitive south Silicon Valley real estate market is not an easy proposition. So when Helen Pastorino, an executive at one of the leading firms in the area, joined upstart Alain Pinel Realtors in Saratoga, California, she looked for every advantage she could get.

To make a splash in the market, Alain Pinel had to offer significantly better service to customers than the competition. Pastorino was savvy enough to realize that the right computer system was a strategic element in delivering outstanding service and managing the operations of the company. She was also prepared to spend heavily for the right system. Backed by substantial funding from private investors, Alain Pinel's strategy was to spend its way to a dominant position in the South Bay luxury home market.

After a frustrating search, Pastorino discovered the NeXT. In June, a gala opening was held for the showcase Alain Pinel office in Los Gatos, California. Center stage were 65 NeXT systems and an elegant suite of office automation tools that featured telecommunications, graphics, and management software.



The installation is the beginning of what promises to develop into an impressive "virtual network" of five offices and over 300 machines. In a few short months, Alain Pinel may have become one of the most technologically advanced realtors in the world.

The search

Though computers are relatively new to real estate, Alain Pinel's needs were typical of firms looking for professional workstations. Real estate agents need custom software to extract information from distant databases and create a variety of reports. They need software that helps them juggle and document phone calls to clients, lenders, and a variety of vendors. And management needs to generate snapshot reports on sales and operations.

Although it was software that would make the difference, Pastorino began by shopping for hardware.

She had learned from one early mistake. Pastorino's first taste of technology had been disastrous: A year earlier, when she had launched her firm's Saratoga office, she had installed a large PC network powered by 80386 clones. Her objective had been to reduce time wasted in everyday tasks, but there were constant bugs and crashes. "It was a nightmare," says Pastorino. "I had no idea I'd spend $180,000 and then it wouldn't work."

She had no more time to waste. In two months, when the doors were scheduled to open at the Los Gatos office, she wanted a workstation on every agent's desk. Accustomed to the swift cycles of her business, where multimillion dollar sales are frequently made in days, Pastorino planned to move quickly.

She considered all the major brands. "There was no emotion," she says. "It was like going out and getting your tires rotated." Nor did the parade of salespeople from IBM, Hewlett-Packard, Sun, Apple, and others that trooped through her office make one box stand out from the others.

IBM sent a salesman who specialized in real estate, but Pastorino wasn't impressed with his industry knowledge. During the Apple sales call, she wasn't able to get references for real estate offices networked with Macs.

Two companies that did better were Sun and Novell. Pastorino was impressed by the long list of network installations volunteered by both companies, and it seemed clear that Novell could deliver the lowest price, at $2000 to $3000 per workstation. Sun moved quickly, sending a supervisor armed with information on vertical markets.

All in the family

At first, NeXT wasn't in the running. With just weeks to go before her decision date, Pastorino's husband, Mark Richards, then a marketing executive at Pixar, convinced her to look at NeXT.

She started with an informal discussion with one of Richards's friends who was an engineer at NeXT. They talked about software. Pastorino said she'd been impressed by a *Harvard Business Review* article about an executive who could generate reports on any part of his business at a moment's notice. The friend said that the NeXT development environment was ideal for such executive information systems.

There was another thing about NeXT that appealed to Pastorino: its design. Cosmetics may seem like a trivial matter, but in the first-impression world of exclusive real estate it is an important consideration. The Los Gatos office was to be a showcase. Outfitting the office with sleek black machines would only enhance the exciting interior design.

But NeXT's sales team was little better than those she'd met from other vendors. It took a week for a sales team to arrive from NeXT, and they weren't well prepared. "I got the sense they didn't care about my business," says Pastorino. "They were indulging me."

They also didn't believe she was a serious buyer. As soon as Pastorino asked about financing, "they told me I couldn't afford it," she recalls incredulously. The NeXT representatives left abruptly, and a stunned Pastorino realized she still hadn't seen the machine.

That could have been the end of the story, except for one last intervention by Richards. He had noticed an ad for customization by a small software company called Adamation and convinced Pastorino to call them up. When she talked with Stephan Adams, the company's energetic president, she at last found someone who seemed to understand her needs.

She decided to make the short drive to Adamation's office in a rough neighborhood of Oakland. "I didn't want to park my car, but I liked it," she recalls. Pastorino squeezed through the bars on the street entrance and made her way up into Adamation's unique loft office, past boxes from a video producer and art-in-progress, to an unlikely oasis of NeXT machines.

Finally getting her first look at the machine, she admits she still didn't "get it," but she did like Adams. He seemed to care about her concerns. "It started to get less technical and became a relationship with people," she says. "I started to realize the software was more important. I was looking at hardware when I should have looked at software."

The closer

After the visit with Stephan Adams, Pastorino asked Sun representatives how long it would take to write the custom real estate software that she needed. One to two years, they said. Novell gave her the name of a company that would do the work, but when she called, they said they could only put her on a waiting list. And nobody seemed to know what it would cost.

Stephan Adams and his brother William did. They had done similar custom work for William Morris's major NeXT installation (see "Profile: The Star System," *NeXTWORLD* April 1991), and the ambitious seven-person firm was small enough to move quickly. The Adamses hashed out a deal with Pastorino to develop five real estate modules. Pastorino thought the initial $100,000 fee was high, but then she wasn't giving them much breathing space: She wanted working copies in 45 days. "She was putting in the machines on a set date," says Adams. "It was a true test of our tools. And NeXT's."

It was also a test of a marriage. Mark Richards was so impressed by Stephan Adams that when Pixar scaled back its operations he joined the small software team. His first big sales challenge: his wife.

A sale that began as a search for the right box had become a search for the right software partner. Suddenly, the final consideration in the sale – the roughly $300,000 price tag for 60-plus NeXT machines – wasn't an impossibly high number. "My biggest concern wasn't about the hardware," says Pastorino. "It was that if I went with some other machine I'd pay half a million or more for the software and find out it didn't work."

In the end, it was not only Stephan Adams and her own husband, but the other Steve that inspired Pastorino to sign on the dotted line. After a second, technical meeting with NeXT failed to convince her to buy, Jobs himself made an appearance. "He did a fabulous demo," she says, seeing the full potential of NeXT for the first time. "I could feel his commitment and energy behind the technology."

During the meeting, Pastorino and Jobs talked dollars. Buying an office full of computers is not unlike buying a property, and she hoped to find a buyer's market. She felt her relatively big order and turbulent sales experience should earn her some discount.

But she found Jobs to be firm on pricing. "Do you want dollars for your pain, or do you want to do what's right for your company?" he asked her. She decided he was right. "I couldn't get what he had somewhere else," she says.

The installation

The breakneck pace Alain Pinel displayed in evaluating NeXT hasn't slowed a bit since the mid-May installation. The NeXTstations are arrayed on every desk in the elegant offices. Three servers are safely ensconced in the company bank vault (Alain Pinel's offices are located in a former savings and loan).

Ask the realtors how much RAM or how many megabytes the machines have and they shake their heads. But ask them what benefits they've seen in Adamation's custom multiple-listing software and they can't stop talking. The focus remains on solutions.

The contrast between the average real estate firm and Alain Pinel is dramatic. At most real estate firms, agents have to arrive early in the morning to get time on cumbersome, screenless systems that dial into listing services. We've all seen the dismal results: standard, cheap computer printouts. To do comparative listings agents often get out the scissors to cut and paste.

NeXT User Profile

Company: Alain Pinel Realtors, Los Gatos, California

Business: Luxury home realtor

Founded: 1990

Employees: 67

Hardware: 62 NeXTstations and 3 NeXT cubes; 5 NeXT printers; modems; scanners.

Software: Adamation's Who's Calling?, In/Out messaging software, Custom MLS and CMA real estate applications, NeXTmail, WriteNow.

Purchase cycle: Two months.

Costs: Estimated $300,000 – $350,000 for hardware; $100,000 initial fee for custom software.

Immediate goal: Speed access to realty boards, customize reports, reduce response times on client inquiries, improve inter-agent communications.

Long-range goal: Convince business partners to use NeXT in order to eliminate redundant paperwork, create snapshot management reports, and link new offices in a "virtual network."

Pinel is encouraging business partners to computerize with them. It's big enough to say, "If you want to work with us, you have to be on-line."

At Alain Pinel, agents don't have to leave their desks when a client calls. Through custom multiple-listing software provided by Adamation, agents can do searches on a range of properties (through a pool of ten 2400-baud modems accessible from anywhere on the network) and generate high-quality, printed reports from any of five NeXT laser printers in a few minutes. While the reports are printing, agents document the phone call in Adamation's Who's Calling?, beginning a running record on the client. To do a comparative listing report, agents simply run properties generated from the MLS module through a separate comparative module.

Photographs of new listings are scanned (on an HSD scanner) into the NeXT. An electronic message circulates along with the scanned image, detailing the property. By August, the firm expected that Metro Scan maps and county data currently available on CD-ROM would be used to print maps for clients that detail listed properties and information about neighborhoods. The data will also be used to inform neighbors when an Alain Pinel property is being sold in their area.

Previously, when agents had a new listing or wanted to share information with the rest of the firm, they typed up a sheet, copied it 60 times, and placed it in each mailbox. E-mail eliminates that wasted time and offers new opportunities. Agents post e-mail about references for business or services they need to serve their clients. "Someone had a client that needed a refrigerator," says Alain Pinel realtor Midge Moser. Once a refrigerator was found, a van was sold through e-mail for the same client. Sums up Moser: "We have more time to provide service."

But Adamation's real-time messaging software is taking agents beyond e-mail. In/Out messaging software enables agents to record when they will be in and where they can be reached. When the secretaries receive calls they scan the In/Out directory and write a quick message telling the agent who is on the line. "With this, they press Return, and in under a second the message is there," says William Adams, the software's designer.

If a new client calls and remembers only part of an address from a newspaper ad, agents can search a custom, in-house database to pull up the property listing. Agents also sign up on the NeXT to show properties. The data is later used to generate weekly reports. It's the kind of instant-snapshot management that Pastorino hopes to expand.

Links to suppliers

This sounds like a lot for a firm that has had its NeXTs only a short time, but it's only the beginning. Pastorino surprised NeXT by how quickly she was prepared to adopt new technology. Now she's surprising her independent business partners, including mortgage houses and title companies. "We're pressuring them to computerize with us," says Pastorino. Explains Stephan Adams: "She's big enough to say, 'If you want to work with me, you have to be on-line.' "

Pastorino is prodding the companies to install at least one NeXT. Once the connections are complete, loan information will be electronically passed between the independent companies, reducing redundant efforts and automating the cumbersome paperwork flow.

"Competition is so tough, you have to get your edge in increments," says Pastorino. "Lenders, mortgage houses, termite companies, they're all perceived to be the same. This is one of the last frontiers on which to make a difference." The strategy seems to be working. At this writing, Alain Pinel's marketing firm was considering purchasing a NeXT, and its wholesale lender had met with Jobs.

But Pastorino isn't waiting around for anyone. Just two months after the Los Gatos office received its first 60 NeXTs, the Saratoga office was scheduled to be purged of its defective PC network, outfitted with 65 NeXTs, and linked to Los Gatos. "As a company grows, you lose the culture of the firm," she says. "I don't want that to happen. I want people to feel they're all in the same building."

In late June, the firm was debating whether the offices needed leased lines or could make do with dial-up. If all goes as planned, Pastorino hopes to expand her "virtual network" to 300 machines in new offices scheduled to open in Los Altos, Palo Alto, and Menlo Park.

Pastorino says that Alain Pinel is the first real estate firm to adopt advanced technology. "Clients go nuts when they see our machines – and they see what the machines can do." And what about the competition? "CEOs and presidents [of other realty companies] know we've opened a Pandora's box," says Pastorino. "They would have liked to have kept that box closed." ◆

NeXTWORLD *periodically chronicles the experiences of major NeXT customers. Future real-time case studies will include follow-up reports on previous subjects.*

J ONATHAN L ITTMAN *is a San Rafael, California, writer. His article about NeXTs on Wall Street appeared in the Fall 1991 issue of* NeXTWORLD.

Solution to crossword on page 8.

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Math for the Masses

Mathematica 2.0 adds aural output and a compiler to its sophisticated modeling tools

by BRUCE BERKOFF

Since the ancient Greeks stood around drawing pictures in the sand, humans have always tried to visualize mathematical concepts. Having computers to solve simultaneous equations was a big leap forward in man's effort to understand mathematical concepts. Mathematica 1.0, a personal computer tool that could display them visually, was another huge stride.

Now, Mathematica 2.0 adds to that powerful visualization kit in yet another sense: It plays the aural equivalents. The innovative sound feature is just one of version 2.0's significant improvements, and that's saying a lot. Such an ambitious program is bound to have a few shortcomings, but overall, Mathematica is an excellent tool across a wide range of applications.

The most obvious uses for Mathematica lie in math education and scientific and engineering research. However, users can be found in any field that requires mathematical analysis, including many business applications. Mathematica is a full symbolic and numeric calculator, a graphical analysis and display package, a high-level programming language, and many other things – all written with the expressed goal of "doing mathematics by computer." Mathematica's interactive front end is based on how scientists do math – from logical step to logical step – backed up by a powerful programming enviornment. Its introduction caused a revolution in the way math was done and an explosion of discovery never possible before. The program is now available on more than 20 platforms, from Macintoshes and DOS machines to supercomputers.

Mathematica has a long history on the NeXT. The program's 1.0 release was shipped as bundled software with NeXT's initial operating system; 1.0 customers will receive Mathematica 2.0 for free. (Mathematica will still be bundled free to NeXT's higher education customers, but commercial customers must pay $1495.) Although there are other programs for performing symbolic mathematical manipulations (such as MACSYMA, developed at MIT in the early 1980s), none match Mathematica's ease for working with both numbers and symbols, as well as for integrating math, graphs, and now, sound.

Researcher's notebook

On the NeXT and several other platforms, Mathematica has an innovative front end called the Mathematica Notebook. The notebook includes editing tools that allow you to mix text, calculations, and graphics in a collapsible outline format simlar to that used in many word processors. As a result, users can organize sets of commands into groups and expand the parts they want to learn about. Many universities are taking advantage of this structure to develop interactively taught classes. In a calculus course at the University of Illinois at Urbana-Champaign, for example, students use Mathematica to explore and discover concepts while the professor concentrates on demos and lab instruction.

The notebook front end varies from platform to platform, whereas the kernel remains essentially the same. The NeXT front end could be used to run Mathematica calculations on a Cray kernel, for example, or to pipe results to and from more traditional programming languages, such as C or Fortran. This is a big plus for those in mixed computing environments, allowing work to be done on any machine that is currently available or best suited to the task at hand.

The 2.0 release also allows multiple kernels to be started from within one notebook (for background calculations) and has vastly improved and expanded error messages and suggestions. It even places the cursor at the spot of a misplaced bracket, although it fails to do so at the location of spelling errors it recognizes and warns you about.

In release 2.0, the notebook front end includes an expanded set of text manipulation features, electronic publishing extensions that make it possible to create entire books within the environment. These books include sound, animated mathematical images, and full text. They collapse and expand at will, allowing the reader random access to contents of the book in a hypertext-like manner. The entire contents of *Exploring Mathematics with Mathematica* (Addison Wesley, 1991), by Theodore Gray and Jerry Glynn, is a Mathematica notebook; the electronic version is provided on CD-ROM with the paper book.

This new release also adds support for popular text, graphics, and sound standards, allowing the user to export and import of data from other programs. This is achieved through MathLink, a companion program. Wolfram envisions sophisticated Mathematica front and back ends to applications like CAD and spreadsheets.

Mathematica 2.0

◆◆◆◆

A unique tool for exploring mathematical concepts through text, graphic, and sound output. Mathematica 1.0 revolutionized the way people used computers to do mathematics, and 2.0's new features, including a way to hear functions, should extend this success. The program is available on a wide variety of platforms–a big plus–but it is unfortunately saddled by a non-standard mathematical notation scheme and copy protection.

$1495 *for business; bundled with NeXTstep 2.0 for higher education NeXT buyers*

Wolfram Research, 100 Trade Center Dr Champaign IL 61820, 217/398-0700

Sound reasons

Mathematica now includes the ability to use the NeXT machine's CD-quality sound, a revolutionary approach that adds an entirely new avenue for finding patterns in data. Just as high-resolution color can add a new dimension to one's understanding of the graphical representation of a complex surface, high-quality sound allows for new insight into some functional displays. (In nuclear magnetic resonance spectroscopy, for example, we often record signals that just happen to oscillate within the audible frequency range (0 to 20KHz). Early on, experimentalists realized the utility of hooking up a speaker just after the preamp to hear the "ringing" of the coil, just to make sure things sounded okay.) This new Mathematica feature will doubtless clarify the connections between the aural and graphical.

Mathematica 2.0 also includes less revolutionary, but nonetheless

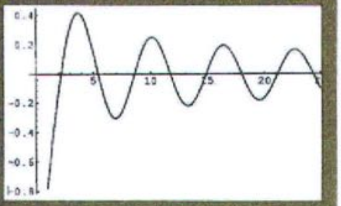
Using Mathematica

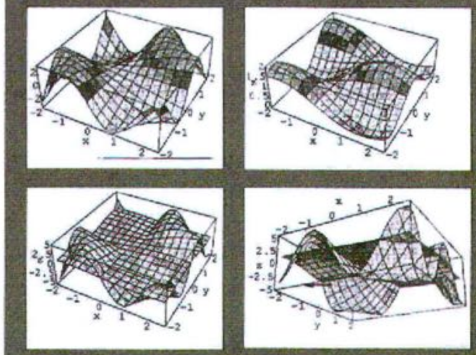
Mathematica can be your ultimate calculator, allowing you to perform simple arithmetic as well as complex numerical calculations that would be arduous, if not impossible, to do otherwise. Type **17+6*7** into Mathematica (and press Enter, not Return) and the program prints "59."

Mathematica lets you get approximate numerical results as well: Typing **N[3^51, 17]** shows the first 17 significant figures of 3^{51} ($2.1536939630755578 \times 10^{24}$). One bug: If you use a number less than 17, you get the default setting of 5 digits.

Suppose you wanted to factor a large integer, like your favorite phone number and still have time for lunch: **FactorInteger[14153660900]** returns the values{{2, 2}, {5, 2}, {109, 1}, {281, 1}, {4621, 1}}, in less than a second.

Graphing complex functions is also a snap. Just type **Plot[BesselY [1,x],{x,1,25}]** to get this result: More complex graphs are now available with the Show[ ] command, which has been extended to produce 3D plots. **Plot3D[3*Sin[x*y],{x,-2,2.5}, {y,-2,2}, AxesLabel->{"x","y","z"},ColorFunction -> Hue]**, yields the top left graph below, while **Plot3D[(1+Sin[x] * Cos[2 y]),{x,-2,2.5},{y,-2,2}, AxesLabel->{"x","y","z"}, ColorFunction -> Hue]** yields the top right graph:



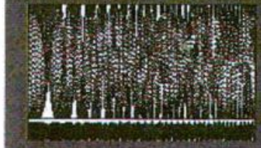


Typing **Show [%,%%]** combines the two plots using the default shading (the bottom left graph). To display the graph from a different viewpoint, try **Show[%,%,ViewPoint -> {1.3,-2.4,-1}]** (bottom right).

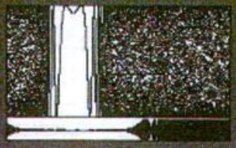
Although it's easy to get a variety of interesting viewpoints, Mathematica has no simple way to invert the view away from the origin.

I can scarcely imagine the fun and discoveries people will have with the new Play feature, which enables you to hear functions:

Play[Sin[30 t^2 + 2 Sin[400 t]],{t,0,2}]



Play[Sin[Cosh[3 t]],{t,-3,7}]



The first sounds like a squadron of B-29s massed and ready for take-off, with their engines roaring in a hypnotic low-toned, beating drone. The second spans the spectra from a fast whoop though slow wiry oscillations past a chirping to static noise, which is really just a limit of the frequency response of my stereo speakers.

by BRUCE I. BERKOFF

useful, extensions over the original version. For example, Sign[] can now handle complex numbers. The program includes some new functions as well, such as NDSolve, which can find numeric solutions to ordinary differential equations. Overall, the number of functions in Mathematica 2.0 increased from 560 to 843.

One of the most requested additions was a built-in compiler for numerical expressions, allowing vast speed increases (up to 20 times faster) for some functions. In the earlier release, users relegated the compiler to development work while they reimplemented their problems in a "real" language to get better speed.

In Mathematica version 2.0, the Show[ ] command has been extended to produce 3-D plots. (You can see the results in the sidebar "Using Mathematica.")

The new improvements to 2.0 literally go on and on: linear programming support, lexical variable scoping, symbolic execution tracing, and international character set support.

Steep curves ahead

Setting up 2.0 on the NeXT is relatively painless but with a significant quirk. After the program is installed, you must call Wolfram Research to get a Mathematica password for your computer, then install this password using Mathematica's MathInstall program. All Mathematica users need a password, whether the program is stored on a local hard disk or on a network, whether or not Mathematica was bundled with your system. Unfortunately, copy protection does not truly serve its purpose – to prevent piracy or tampering – but interferes with routine, responsible operation of software across complex networks. Instead of tracking the total number of licenses, an administrator is forced to track individual CPUs as they move on and off desks. Mathematica's use of copy protection is a definite drawback.

Documentation for the program was not available in time for this review. The vast majority of Mathematica users, however, purchase the book *Mathematica* by the program's author, Stephen Wolfram (Addison Wesley, 1991), and use it as a reference guide. The book is not NeXT specific, but Mathematica works much the same on all platforms.

Learning Mathematica can be intimidating, and not just because it is a sophisticated program dealing with graduate-level technical concepts: it does not use standard mathematics syntax. Why can't it understand the already familiar notation we've all been raised on? Instead of letting the user type **2sin(x3-y1/2)*e(-2x)**, Mathematica forces the user to type **2Sin[x^3-y^1/2] * Exp[-2 x]**.

No one's going to use Mathematica instead of a desk calculator. Rather, it's an environment for understanding complex problems mathematically. When business users and artists see the 3-D graphs Mathematica offers as output, they'll want to get their hands on it, but they'll find that those lovely forms are attainable only by knowing secret passwords like **Plot3D[3*Sin[x*y],{x,-2,2.5}, {y,-2,2}, AxesLabel->{"x","y","z"}, ColorFunction -> Hue]**. Well, scientists deserve some tangible reward for their labors.

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A Batch of Compilers

Third parties supplement NeXT's programming toolkit

By SIMSON L. GARFINKEL

Compilers are a crucial component in the chain that creates applications. Programmers write sets of instructions in special programming languages like C, BASIC, Pascal, and Lisp. Each one of these instructions, like DO or PRINT, translate into many discrete operations by the microprocessor that runs the computer. The compiler translates between the high-level programming language and the machine language that the microprocessor can understand.

In addition to doing this basic function, compiler products often include auxiliary products necessary to complete the programming task. These might include a function library or a debugger, a tool that steps through a program until it breaks, pinpointing the exact problem that needs fixing.

Programming tools

If you have the NeXTstep 2.0 Extended Edition, you've already got a powerful software development environment: the Free Software Foundation's GNU C Compiler, GNU Debugger (GDB), and Emacs, a program editor. The C compiler has full support for both the Objective C and C++ languages, as well as standard ANSI C. The debugger, which allows source-code-level debugging of all three languages, is one of the best on any platform; the Emacs GDB interface lets you trace program execution in one Emacs window while following the current spot in your source code in another. What more could you want?

Plenty. If your livelihood is spent maintaining and running a 100,000-line Fortran program, the prospect of trying to rewrite it into C or C++ is simply a non-starter. What you really want to do is take that Fortran program, link it with an Objective C front end, and have it graph its results in a NeXTstep window. You can do that with Absoft Corporation's Fortran 77, reviewed below. Alternatively, you might have a Lisp expert system that you might want to have running on the NeXT, taking advantage of the NeXT's graphical interface. If so, Franz's Allegro CL is for you. Or in any case, you might just prefer using a language other than C or C++, or you might like the feel of a competing product.

Review guidelines

There are many criteria for judging the quality of a compiler. First, does it work? Does it compile properly working code into a program that can run on your platform? Also, since NeXT programs need to conform to a specific interface, we judged how well a compiler provided a connection between itself and NeXT tools like Objective C classes and Interface Builder.

Then there is the question of how well the compiler completes the task. Normally, one would look at how efficient the compiled program is compared to the source, or original, programmer's code. There are standard benchmarks to make this determination. Unfor-tunately, it seems that compiler manufacturers often make sure that their products do well on these few specified tests. Therefore, our tests focused on code of our own design. Further, because of the lack of head-to-head competition between these compilers, we downplay the importance of formal benchmarks in our review. It should be noted that one vendor, Oasys, takes severe exception to our policy on this issue.

Because compilers are generally used by skilled, relatively expert users, we have given less weight to documentation and on-line help than we do with reviews of products designed for end users. Also, since most programming is done on featureless, character-based screens, we did not heavily weigh the user interface.

In this review, we've looked at a number of compilers available for the NeXT, along with the BugByte debugger. They are grouped by general utility and approaches to the compiler problem.

Compilers the NeXT way

Both Fortran 77 and Allegro CL are examples of how a compiler should be ported to the NeXT platform. Each company started with a reliable, full-function compiler, and then added support for NeXT's Objective C and Interface Builder.

The idea of using Objective C with Fortran or Lisp might seem a little odd at first. Here's how it works: From within your program, you tell the compiler which Objective C classes you want to use. Then – just as from Objective C – you send the class a message to create a new object. Once you have an object, you can send the object messages as well.

Using Interface Builder nib files is only slightly more difficult. Basically you have to create a new Application object and send it a **loadNibSection:owner:** message. Both Absoft and Franz include numerous examples of how to interface between their languages and NeXTstep.

Of course, you'll need the keyboard to write your programs. Although you can use these compilers from Terminal's command line, you'll be happier if you run them from within Emacs. Emacs has a Fortran mode that knows all about Fortran indenting, tabbing, and continuation-line semantics. You can compile from within Emacs by using the M-X compile command. And GDB works fairly well for source-level debugging of Fortran programs. (Although GDB will not display the EXTENDED, REAL*12, and COMPLEX*24 data types, you can write your own functions to print these values and call them from GDB.)

The beauty of Lisp, of course, is that the development environment includes an integrated compiler and debugger. Franz's debugger and Lisp inspector (another programming tool) are very nice; they're built into the main command loop rather than supplied as separate systems, as is the case with other versions of Lisp. Franz has made extensions to Emacs to make the inferior Lisp mode work even better. Of course, all of this takes memory. Don't even think about running Lisp with less than 16MB of RAM; 24MB or more is a must for serious work.

Franz's Lisp was originally shipped bundled with the NeXT operating system, back when NeXT was aiming for the university marketplace. Although the compiler wasn't bundled with NeXTstep 2.0, NeXT will be providing a free upgrade for all 1.0 customers who ask for it.

We consider both of these products to be excellent. Both fit well into the NeXT environment and do their unique jobs well. We award five cubes, our highest rating.

If you must use COBOL

If the idea of running an antique batch-oriented mainframe computer language from the 1950s on your 1990s workstation turns your stomach, we're with you; but if you must, Acucobol's COBOL compiler will let you do it.

The compiler is just the company's standard UNIX COBOL compiler, recompiled for the NeXT and shipped on a 3.5-inch floppy disk. Installation is difficult. After you get the files off the floppy disk, you must copy a special file into a system directory. (COBOL doesn't use the NeXT's standard **/etc/termcap** file). Then you have to edit this file if you want to run Acucobol's demonstration programs, since the NeXT keyboard doesn't have functions keys. Finally, you have to edit your **/etc/rc.local** file and reboot your computer to start the COBOL record-locking daemon. More thought is needed here.

Beyond installation headaches, there are problems with the COBOL implementation itself. Acucobol's Acucobol-85 is a solid, reasonably fast COBOL implementation that runs on a wide variety of platforms, including PCs. But because the company is committed to having virtually the same program run on every platform, the NeXT COBOL implementation has all of the PC's limitations: Acucobol programs can have a maximum of 1MB of code and 64KB of data. COBOL programs must be run from the Terminal; there is no support for NeXTstep or Display PostScript. And there's no provision for simultaneous access of the same database from different workstations (because Acucobol's lock daemon runs on your workstation) instead of your network server.

Acucobol is currently designing a version of its product that will run under NeXTstep, but that version isn't expected until the middle of 1992 at the earliest. If for some reason you have to run COBOL on the NeXT, you can probably do it with Acucobol. But why would you want to? We give this product two cubes.

TermiNeXT

Although not a compiler, BugByte 1.0 – a graphical front end to the GNU Debugger – is conceivably useful for anybody who develops programs on the NeXT.

BugByte has a main window that shows the source code of the module that you are currently debugging. Four buttons let you set, clear, enable, or disable breakpoints; they show up as iconic stop signs in the left column of the display. A Function Inspector lists all of the source files and the functions that they contain in your program. The Frame Inspector lets you look at the stack frame.

In many ways, BugByte mirrors functionality already available on the NeXT: GNU Emacs has a **gdb** mode that provides much of the functionality of BugByte. In fact, a lot of common debugging tasks, like jumping up and down the stack frame, are faster from Emacs.

BugByte shines in the way that it makes use of the NeXT's windowed screen to show a lot of information about your program all at once. But a lot BugByte functions are more complicated than they should be. For example, to discover the contents of a variable, you click on that variable and press Return, but its value appears in another window. There isn't even any indication that the variable and its value are related.

Also, BugByte doesn't check the user's breakpoints to make sure that they're valid. You can just as easily tell the program to set breakpoints in comments as in actual code. Breakpoints in comments won't do anything, but the program will happily display them, confusing novices and expert hackers alike. Another problem with BugByte is that it displays only one code window on your program at a time, isolating the debugging process from the code writing.

BugByte is a good idea for programmers who don't want to use Emacs, but the product needs more fine-tuning before it becomes a viable alternative to GNU Emacs. We give it three cubes.

Straight across

Oasys sells its Green Hills Compiler Family of C, C++, Pascal, and Fortran for 19 different computer/operating system combinations. Their compilers can generate code that runs on the Motorola 680x0 processors, the Intel 80386, the AMD 29000, as well as several other architectures. One of the great strengths of the company's compiler offerings is that all of the languages use the same calling conventions, so programs written in one language can call subroutines written in another.

This theme of interoperability runs through all of Oasys's compilers. These are probably the only compilers still supported by a solvent company that can generate code for computers built by Charles River Data Systems or generate in-line calls for the Sky floating-point unit.

Unfortunately, the generality is not needed on the NeXT platform.

Object-Oriented Fortran 77	◆◆◆◆◆	*A complete implementatiojn of the FORTRAN 77 Language, extended to work with NeXTstep and Objective-C. An excellent product.*	**$995**	*Absoft Corporation, 2781 Bond Street Rochester Hills, MI 48309. 313/853-0095*
Allegro CL Ver. 3.1 (Common Lisp)	◆◆◆◆◆	*A comprehensive Common Lisp implementation, extended to work with NeXTstep and Objective-C. An excellent product.*	**$1875** **50% discount for education**	*Franz, 1995 University Avenue Berkeley, CA 94704. 415/548-3600*
Acucobol-85	◆◆	*A platform-independent COBOL development and run-time system. No NeXT specificity.*	**$1995**	*Franz, 1995 University Avenue Berkeley, CA 94704. 415/548-3600*
BugByte 1.0	◆◆◆	*A NeXTstep front-end for the NeXT's GNU Debugger. Not a viable alternative for Emacs with GDB yet, but useful for some people.*	**$295**	*Acucobol, 7950 Silverton Aveneu #201 San Diego, CA 92126. 619/271-7097*
Green Hills C Compiler	◆◆	*A UNIX 680x0 native C compiler. Does not cooperate with the NeXT and in fact conflicts with it.*	**$1200**	*ONyX Systems, 2325 Clareton Drive Arlington, TX 76018. 817/432-9107*
Green Hills Pascal Compiler	◆◆◆	*A UNIX 680x0 native Pascal compiler. An acceptable Pascal implementation; nothing NeXT specific.*	**$1700**	*Oasys, 230 Second Avenue, P.O. Box 8990 Waltham, MA 02254-8900. 617/862-2002*
Green Hills FORTRAN Compiler	◆◆	*A UNIX 680x0 native FORTRAN compiler. No NeXT-specific features, some compiling problems.*	**$1700**	*Oasys, 230 Second Avenue, P.O. Box 8990 Waltham, MA 02254-8900. 617/862-2002*

COMING ATTRACTIONS

MicroPhone II

The first commercial communication program for the NeXT puts you on-line with a host of features

by ROBERT LAURISTON

Are you a mere mortal? Fed up with having to make do with tip to access on-line services, BBSs, and non-UNIX mail systems? Take heart. By the time you read this, Software Ventures should be shipping MicroPhone II, a full-featured, menu-driven NeXT telecommunications program.

Judging by the early beta version I examined, MicroPhone II for the NeXT will be very similar to the current Macintosh and Windows versions of the product. That means a couple of terminal emulation options (TTY and VT102, plus variations), a choice of file transfer protocols (X-, Y-, and Zmodem – no Kermit in 1.0) and modem standards (Hayes, Telebit, V.32bis, and MNP5), and a rich, flexible scripting language.

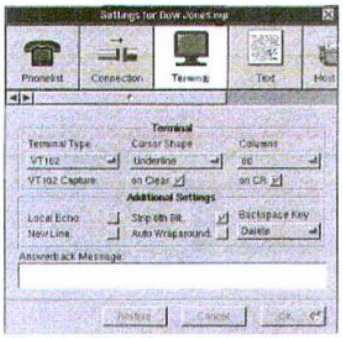
Creating scripts to automate MicroPhone sessions can be as easy as turning on its "watch me" mode and logging on to a service. Once you've recorded the script, you can assign it to a push button at the top of the MicroPhone terminal window and decorate the button with one of the icons included with the program. If you want to get fancy, you can use the program's script editor to add logical branches, prompts, dialog boxes, and custom command buttons.

Using programmable menus and push buttons, power users can create custom MicroPhone front ends for those less technically inclined. It's even possible to create a front end with Interface Builder and link it to a MicroPhone script. Luckily, Software Ventures plans to include canned front ends for CompuServe, Dow Jones, GENIE, the Internet, and possibly MCI Mail in the initial release, with more to follow later.

There are a few MicroPhone goodies unique to the NeXT version. You can use NeXTstep's built-in Spelling utility to check your on-the-fly typing before you post it for the world to see. NeXT users not attached to a network will be able to use MicroPhone to receive NeXTmail messages, though graphics and Lip Service sound will be stripped out of the main message and attached as separate files. You can set up MicroPhone to track Usenet news groups (like comp.sys.next) for you. Your network guru can even create special connection scripts that let you dial out using a modem attached to a network server or another workstation.

One MicroPhone idiosyncrasy I found hard to get used to is that serial port settings (like 1200-N-8-1) apply to all the services in a dialing directory. You can get around this by using a separate session file for each service you call or by including port-setting commands in each script. On the other hand, I really like the way the open-ended screen buffer works. When downloading a long passage of on-line text, you can start reading the beginning while MicroPhone keeps downloading the rest.

MicroPhone II for the NeXT looks like it will prove a powerful telecom tool. With a little assistance from a local NeXT expert or Software Ventures' phone support, even the most naive NeXT user should be able to get on line. ◆



Terminal

Terminal Type: VT102

Cursor Shape: Underline

Columns: 80

VT102 Capture: on Clear ☑ on CR ☑

Additional Settings

Local Echo ☐

Strip 8th Bit ☑

Backspace Key: Delete

New Line ☐

Auto Wraparound ☐

Answerback Message:

MicroPhone II's Settings panel simplifies complex telecommunications commands with a NeXT-like graphic interface.

"Coming Attractions" are first impressions of important unreleased software packages. *NeXTWORLD* will publish a full review with cube ratings in a later issue.

ROBERT LAURISTON *is a contributing editor for* NeXTWORLD, PC World, *and* Nikkei PC. *He can be reached by e-mail at duck@well.sf.ca.us.*

Although Oasys has been shipping its compiler offerings for the NeXT computer since 1989, the company has still not adopted its programs to the NeXT platform. Installation is complicated by the fact that Oasys doesn't use NeXT's installer program, nor does it provide any automatic installation system. The company doesn't even provide NeXT-specific printed documentation.

Oasys's C compiler cannot be used with many of the NeXT-provided include files in **/usr/include**. (Oasys includes its own version of **stdio.h** and **stdlib.h**, which its compiler invisibly substitutes for NeXT's when the **#include** directive is processed.) After I modified my test programs for use with Oasys's C, I was unable to compile the programs with NeXT's built-in GNU C Compiler. Although the Oasys C compiler produced code that was more compact than the GNU C Compiler, it required significantly more space for constants in the __DATA segment. When the amount of code in __TEXT and __DATA were added together, GNU C actually used less space.

Oasys's Fortran compiler is a full-featured Fortran that supports VMS, Fortran 77, and Military Fortran. This would probably help somebody trying to port a large program written in VMS Fortran or Military Fortran to the NeXT. The Fortran defaults to VMS Fortran; the **-novms** flag must be specified for Fortran 77 compatibility. Even with this flag, the compiler could not handle the REAL*12 data type.

The Pascal compiler is a good one, though Pascal is little used these days as a professional tool. Some high schools are still using the language, but not many are going to cough up the $1700 that Oasys's Pascal costs – especially when Turbo Pascal for the PC costs $149.95.

Although none of these compilers have been modified to work with Objective C, they will all generate code you can burn into ROM. Moreover, Oasys documents which operating system calls (like **open(2)** and **read(2)**) need to be supported to make the code they produce run on another platform. That's great if you're writing programs for an embedded computer that runs without operating systems. If your writing programs on a NeXT, however, you'll probably want to use something else. We give the C and Fortran compilers two cubes and the Pascal compilers three cubes. ◆

SIMSON L. GARFINKEL *is a senior editor at* NeXTWORLD.

ADOBE ILLUSTRATOR 3.0

L Illustrator is like a really good racing bicycle. You know that only skilled folks can get the full value from it, but after Greg LeMond hops off, you try a spin just to enjoy traveling at warp speed. Of course, what happens is that your butt hurts.

Don't get me wrong. I love Illustrator – not necessarily using it, but watching other people use it. This is not meant to be sarcastic. It needs all that functionality for professional illustrators; I'm just not that type. And as stupid as it sounds, I've never been as successful using a drawing/painting program as I was with the original MacPaint.

Barlow & Lavin

The fact is that only so many of us actually illustrate. For those who do, Illustrator is fabulous, perfect, a thing of beauty. The thing I especially like is the Auto Trace tool. Take an image, start tracing, and soon the image is reduced to a huge number of little dots that are easily manipulated. I also like the wide variety of brushes and blending tools. It feels like one of those stand-up Snap-On Tool chests down at the garage.

The other great thing is the documentation. These docs are huge, complete, and well indexed.

All of the goodies round out the mix. Modifying the structure of Type 1 fonts on the fly is fun. Producing graphs with pictures of objects instead of boring lines makes everyone a little *USA Today*, even if the potential for abuse of this feature is high. My only wish is a special switch to turn this into a mere mortal Illustrator. They could label it Stupid mode. I won't mind. **Big thumbs up.**

B *The same folks who bought Macs so they could use Illustrator should now seriously consider switching to the NeXT for the same reason. The most important reason is speed. Redrawing a complex illustration on even the fastest Macs is like watching paint dry. It gets much worse when color is involved. Add to this the fact that you have to wait for that glacial redraw every time you switch between artwork and preview modes (which you must do often) and it can become a real character builder. With Illustrator for the NeXT, you can stay in preview mode. What you draw is what you see.*

Printing is also much faster. One drawing that took my Mac and NTX LaserWriter 16 minutes to print came ripping out of my NeXT printer (in higher resolution) in 27 seconds. **My thumb is up and it's even bigger than yours.**

SOFT PC 2.0

B The sight of the dreary DOS prompt on a graphical screen has always seemed a little perverse. Nevertheless, DOS is what drives most of the PCs in this harsh world. It's a terrible thing, but there it is.

For that reason, a "non-standard" machine is rendered far more practical by the presence of SoftPC. It enables the enlightened Mac or NeXT user to examine the data generated by his primitive colleagues in their native habitats. Furthermore, there remain a lot of MIS tyrants in the corporate environment who will not let you put a non-DOS machine on your desk. Thus, SoftPC allows one to be cool and employed at the same time. Not a bad deal.

Unfortunately, the Mac is just too slow to run SoftPC for anything but occasional purposes. It creates a virtual PC in my SE/30 that operates at about half the speed of an AT-class clone. And that's too slow.

SoftPC for the NeXT is another matter. Juiced up by the 68040, it's able to create something equivalent to what you'd pay $1500 for at Fry's – a real 12MHz 286 with an EGA monitor and a very large hard disk. And it runs every piece of DOS software I've thrown at it.

Furthermore, it does something clones can't do: genuine DOS multitasking. By running several copies of SoftPC concurrently, one can copy and paste between, say, a Lotus spreadsheet and a WordPerfect memo. Or recalc the spreadsheet while writing the memo.

The only thing it can't do as well as any other clone is run Windows. (Actually, it can, but during the time it takes to translate Windows graphics calls, one could easily lose interest in the outcome.) I'm not sure this is a problem, though. Unlike most software, of which more copies are in use than have been bought, Windows, as Esther Dyson pointed out, is bought more often than it's actually used.

I loathe DOS. But its evil is loose in the Real World and one must live with it. SoftPC on the NeXT is the best way I know to do that. Tell your boss it's just a black clone with an attitude. He'll never know the difference. **Thumbs up.**

L *John, I agree that SoftPC is extremely well done. But you are dead wrong on the importance of graphical programs like Windows on the PC. People who think a million copies of Windows are being sold and not used are deluded. They're like the car makers who thought millions of people bought Japanese cars because they were cheap but didn't really like them.*

SoftPC must get its act together on graphics speed and be less confusing on its interface with external hard drives and the like. Still, it's a cool product. I think Insignia should gamble that Apple laid off its lawyers in the most recent reorg and produce a SoftMac/NeXT. Now we'd be talking seriously cool. **Thumbs up.**

FLOPPYWORKS 2.2

L We can all be pleased that DIT took the bull by the horns and produced this product. FloppyWorks does several things, but all that anyone really cares about is that it allows you to read Mac files. Actually, that's something NeXT should have done itself in System 2.0, but that's not DIT's problem.

There are, however, some shortcomings with the product. First, it is a stand-alone application. The relatively clumsy interface gets in the way of simple operations. The Browser-like system for manipulating files is different enough from the NeXT standard to cause fits. Installation is no fun nd not at all network-friendly. All these things are DIT's fault. Also nnoying, though not DIT's fault, is that you can use only Macintosh uperDrive (1.4MB) floppies. Earlier 400K and 800K disks are not readble by the Sony drive in the NeXT.

Despite all this, DIT has done a real service with a solid product. It orks much better for simple file transfer than does the several-thousandollar GatorBox. And the price is right at $250. **Thumbs up.**

As you say, you can't take DIT to task for FloppyWorks's inability to read smaller Mac disks. It's a NeXT hardware problem that DIT has taken the trouble to address the only way it could: It built it's own external floppy drive, the CubeFloppy, which reads 800K disks well. Furthermore, DIT went to the trouble to ake it's software recognize and read several different Mac formats of Quest disks.

Finally, I'm not sure what about their exceptionally smooth interce could cause you such fits. While it would be nice to see those Mac isks pop up in the Workspace, you'd be missing the ability to use loppyWorks's important translation filters when copying files, if you nplemented it that way.

You're wedged, pal. But FloppyWorks isn't. I probably use it ten mes a day, and I'm very grateful for it. **Thumbs up.**

DIGITAL LIBRARIAN 2.0

Librarian is almost a really wonderful thing. It's especially useful for a disorganized writer like me, since I can never seem to remember where I stash information. It would be nice if the NeXT also offered an effective way to find files which might have been buried in the data brambles of a 660MB hard disk. The so-called finder" is erratic and slow. But if the finder makes it hard to search for les by name, with Librarian you can index all your data directories and arch by content.

It's also excellent for its most common purpose, which is searching n-line documentation. You can also use it to search the works of hakespeare, or anything else you might drag into its target window, such s, in my case, the King James Bible.

Unfortunately, Librarian also has some problems. First, it's fairly usess with large files. If the files aren't broken up into small pieces, it isn't ing to get you very far. Second, it lacks the ability to search for strings. just looks for the words themselves. So if you're looking for, say, "quick d fox," it's as likely to give you "the quick and the dead" as its first hit. also can't do multiple word searches.

Third, it doesn't really search the target files but rather an index of all e words in them. That would be all right, but it doesn't update these dexes as changes are made (unlike a similar Mac product, OnLocation). you're searching an active data folder, you have to periodically create a w index from scratch, a time-consuming process. Worse, it has a butn, "Update Index," that doesn't update the index. The only way to do at is to eliminate the old index and create a new one.

Librarian is like a lot of things on the NeXT. Incredibly cool in conpt but still a little short on delivery. I guess I'm thumbs up, but I want it become the valuable writer's tool it promises. **Thumbs up.**

Librarian is truly dangerous in the right hands, but those hands don't seem to be mine. It sat there looking forlornly at me from the dock for about a year, then got displaced for a permanent TextArt slot. This is one of those tools I thought I'd use all the time, and it's even more frustrating that other people I know seem to be using Librarian all the time.

Basically, the incredibly simple interface on the Librarian just does not lend itself to the everyday work for which it would be truly useful. Maybe it needs to be more complex. Maybe the Librarian could be more than a service. It could be a panel shared by all appplications, like the Font panel. My system-level friends will be all over me for that one, but it would let me open it more than once a year. Because I don't find it useful, **I'll put my thumb sideways on this one.**

NeXT KEYBOARDS

NeXT began with the old keyboard – a pretty mediocre product compared to similar offerings from other manufacturers – then made it worse. The old keyboard suffered from being too flat, unorthodox in its handling of special keys like Alternate and Control, and lacking function keys. Of course, the keyboard was not the worst part of the original system. That distinction belonged to the mouse.

When the new systems came out, someone noticed that the original keyboard was not nearly as atrocious as the mouse. They fixed that problem. The new keyboard is so bad that the keys are even arranged wrong. It's useless for UNIX. Several keys were moved out of easy typing range. Programming is much harder on the new board. A few key combinations are not even possible on the new board.

All the really cool people have a new '040 machine or upgrade and an old keyboard. **Old keyboard: Thumb down. New keyboard: Thumb even more down.**

I must be one of those really cool people. I have an old keyboard and an '040 machine. And I'm grateful for that. While I'm far from being the UNIX weenie I aspire to becoming, I use the Terminal enough that I'm glad the common UNIX keys on my keyboard are put where I can get to them.

Actually, my keyboard complaint has to do with a larger issue: mouse religion. It is apparent from the relative lack of command-key combinations in NeXT's bundled programs that they believe you should reach for the mouse a lot. (Maybe it's like a Tibetan prayer wheel. Every time you use the mouse, it's an act of homage to Steve.) What I really want from NeXT is an extended keyboard and a macro program.
Old keyboard: Thumbs up. New keyboard: All thumbs. ◆

Is it a coincidence that JOHN PERRY BARLOW *keeps saying he is grateful? As for* DAN LAVIN, *if he were any cooler he'd be dead. Send e-mail while you still can: jbarlow@nextworld.com and dlavin@nextworld.com.*

NeXT Best Thing to Being There

As a telecommuter, you should be able to perform your essential job functions from home or other remote locations, but you hit stumbling blocks. How do you get to a file or printer at the main office's LAN, or run that one specialty application that you don't have on your home machine? Or if you run a small business with remote sites, how can you bridge the local networks in order to more efficiently share resources? Your colleagues in the universities have access to the massive resources of the Internet. How can you get on the Internet if you're a home NeXT user?

Teleconnect from Marble Associates offers an integrated solution. This suite of software applications enables a NeXT computer to run the Internet protocol and all software packages that depend on it via modems and plain old telephone lines. It includes a commercial implementation of the UNIX SLIP (Serial Line Internet Protocol) program and associated utilities. Once Teleconnect is set up on your computer and the remote LAN, connectivity is seamless and transparent. Whenever you attempt to access the remote network, Teleconnect will use the modem to call the server and establish a teleconnection. At that point, you may send mail to users on the LAN, transfer files via the **ftp** and **rcp** utilities included with NeXT computers, or access remote file systems that are mounted via NFS. Once you're finished, Teleconnect will save phone charges by automatically hanging up the telephone.

Teleconnect differs from conventional PC communications products in two ways. It connects a remote user to a network and all shared network resources, rather than to a single computer. Teleconnect does not restrict the user to a single terminal window or application: It exploits the multitasking abilities of UNIX and the NeXTstep environment to enable the user to run many applications concurrently over a single teleconnection. Teleconnect also differs from other implementations of SLIP by conforming to the graphic and iconic conventions of NeXTstep.

Teleconnect itself is easy to install and configure. The Teleconfigure application may be set to connect to a maximum of 16 remote computers. The main teleconfiguration panel contains fields for the IP addresses and hostnames of both the localhost and the remotehost. You specify how to connect to the remotehost in a third field by entering the phone number of the remotehost, the modem script to be used, and the port your modem is on.

The main hitch in setting up teleconnections is properly configuring the modems on either end. Teleconnect comes packaged with scripts for popular modems from Telebit, Intel, Hayes, Digicom, and Neuron. But despite Marble's best efforts, the number of modem brands and possible configuration settings complicates the process of initiating a teleconnection.

Depending on how well you →

Marble Teleconnect

◆ ◆ ◆ ◆

Teleconnect is a commercial implementation of SLIP, a UNIX program for running a session on a remote computer over a serial line. The beta version reviewed was solid, well-designed, and functioned flawlessly. Marble could provide more automatic tools for configuring modem settings.

$249

Marble Associates, 38 Edge Hill Rd.,
Waltham, MA 02154. 617/891-5555

Fast Backup

If you need to back up a lot of data in a hurry, Maynard Electronics' digital audio tape (DAT) drive might be for you. This little box can dump as much as 11MB a minute onto a 4mm DAT. A 60-meter tape that you can buy at most electronics stores costs as little as $11, making the cost-per-megabyte about 0.8 cents, or 55 times less than the NeXT optical disc. By archiving unneeded items from your hard disk, you can save hard disk space that costs about $2.50 a megabyte.

Installation is a snap. Simply set the DAT drive to an unused SCSI address, connect it to your NeXT, and turn on the power. When the NeXT boots, it automatically scans the entire SCSI bus and assigns the tape drive to the UNIX device **/dev/rst0.** This exact address is important, because Maynard ships the product without software, so you must use the UNIX **tar** and **dump** utilities to manage backups.

The drive is fast and it works well. Using **tar,** I was able to back up my 51MB home directory in 8 minutes, 42 seconds (10.5 seconds per megabyte). With **dump,** I archived 142MB of files in 12 minutes, 39 seconds (5.3 seconds per megabyte). Those times are based on archiving from the NeXTstation's internal 105MB drive; performance will be substantially degraded if you archive from a network-mounted disk. While these times are fast, keep in mind that tape is not random access, and it must wind to find specific files for retrieval. This process, while fast for a tape drive, is very slow compared to optical or hard drives.

The ArchiveST2000e compares favorably with the Exabyte 8mm digital videotape backup unit sold by Sun Microsystems for use with their workstations. Sun's tape drive costs $4000; a box of ten 2.3GB tapes costs $300. Sun quotes a transfer rate of 14MB per minute, but the time to back up a file system would be roughly the same with either of these machines, since the speed is limited by SCSI bus transfer rates.

A green light on the drive's front panel indicates that a DAT tape is loaded and ready to go; a red light indicates that the unit is busy. Notably missing is a light to indicate if the power is turned on. A small push button makes the tape eject. Maynard currently ships the drive in a platinum-white box, but the company says it might start selling the drive in a black box if there is sufficient demand.

Overall, the drive is an excellent, if pricey, solution to the backup problem. It needs NeXT-specific software and a lower price to make it a must-have product.

by SIMSON L. GARFINKEL

ArchiveST2000e DAT tape drive

◆ ◆ ◆

An external DAT drive for any NeXT, this device provides high-speed, high-density backup onto a low-cost digital audio tape, but lacks NeXT-specific software.

Drive: $4475
90-meter (2.1GB) DAT tape: $60 (direct from Maynard)
60-meter (1.3GB) DAT tape: $11 (local electronics store)

Maynard Electronics, 36 Skyline Dr.,
Lake Mary, FL 32746. 407/263-3500

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→ Teleconnect

now your modem, establishing onnectivity between two sites anges from reasonably easy to ownright hard. *NeXTWORLD* ad to experiment with multiple odem settings on its Telebit odems before it could successfully un a Teleconnect session. One of e only drawbacks to this excellent oduct is that Marble hasn't proided more support for modem setngs. Fortunately, Marble offers rst-class technical support.

Teleconnect is an essential tool r any NeXT site that supports emote users on a regular basis, nd for businesses that need to nplement basic wide area networking. It points to the day when ansparent wide-area connectivity ill be as commonplace as today's olated personal computers.

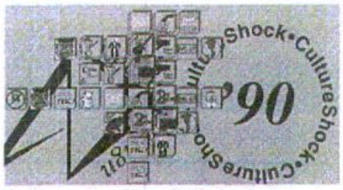
y SETH T. ROSS AND ANIEL MILES KEHOE

Goof-off Time

Since the only machine on my desk is now a NeXT, I'm faced with a dilemma – I've got to leave my desk to goof off. There are simply very few games for the NeXT. So you can imagine my excitement when I received Culture Shock, the first commercial game for the platform.

Unfortunately, Culture Shock is really a shareware-quality program that you buy like commercial software. Based on a traditional game played with tiles, it is similar to two Macintosh programs, Gun Shy and Shanghai. The object of the game is simple: clear the board by matching tiles according to specific rules. There is no documentation, but the on-line help covers all the basics.

Athena Design has added a twist by basing the game on pop culture in 1990. In most cases, a short sound clip plays when tiles are matched and removed: Madonna songs, President Bush saying "Saddam Hussein," or a snippet of Stevie Ray Vaughn. The sounds were very popular around the office, especially about the 10,000th time Madonna justified her love. The sound quality suffers due to the size constraints of a floppy.



On the way to a loss, a typical end-game. Match the two worlds, for example, and they disappear from the screen.

The images are somewhat confusing, blending into the background. They become tiresome over time, as do the accompanying sounds. The game also relies too heavily on the entertainment industry for events of 1990. Another problem is that as in other types of solitaire games, not every starting position is solvable.

Balancing the game's weaknesses is its price – $24.95, a reasonable price for a basic game with some continuing interest – the game requires multiple plays for the user to acquire skill. Athena Design is to be congratulated for a good first effort and encouraged to create more games for the NeXT. Of course, after several dozen plays, I'm back at square one: Until there is more entertainment software for the NeXT, I'll have to goof off on my own time.

by DAN LAVIN

Culture Shock

◆◆◆

The only commercially available game for the NeXT, Culture Shock is shareware quality but priced accordingly. It is a twist on an old tile-matching game using 1990 current events.

$24.95

Athena Design, 306 Thayer St. #89, Providence, RI 02906. 401/353-8509

A Class by Itself

Ever since Steve Jobs demonstrated faxing directly from the NeXT a year ago, there has been high user interest in the x modems that make this a reali. Several products have appeared n the market, but the Neuron AX96+ has generated an inordiate amount of curiousity and terest because it claims to offer th 9600-baud fax and 9600ud modem capability. Because xing is fundamentally different an modeming, 9600 speeds in xes are standard, while 2400 is a ore typical modem speed for this pe of product.

Neuron has announced that it tends to ship a telecomm proam, Synapse, and Marble Telennect (see the Teleconnect view on the previous page) along with the hardware. At press time, the software was not yet ready. Meanwhile, the modem is shipping without it, so we looked at the modem by itself.

Neuron provides 9600-bps fax capability combined with a fast, full-featured Hayes-compatible data modem with the V2.2, V3.2, and V4.2bis protocols. Neuron claims even higher speeds when communicating between two Neuron modems using optimized protocols, but we were not able to verify those claims.

The Neuron modem comes in a solid black metal case with two serial cables and an RJ11 telephone cable, ready to connect to either a 68040-based NeXT or 68030 Cube. The end pieces of the modem are plastic, however, and seem a little flimsy. The whole thing is nicely packaged with documentation on the modem itself, configuring the fax modem, and using the data modem with the future bundled software.

Configuration of the fax capability is straightforward. Neuron provides an installer and a clear manual that walks you through the procedure. Accessibility to the modem can be controlled so that other machines on the network cannot use it. One oversight is that there is no option to turn the modem's speaker off. Also, a visual indicator on the MegaPixel display that the modem is in use would be helpful.

Most fax modems have the annoying shortcoming of requiring the user to reset it whenever switching from fax to data and vice-versa. Neuron provides its own fax/data driver that can automatically switch modes so that a remote machine and modem can call your FAX96+ and log in to your NeXT. The modem is always in data mode except when actually faxing. The quality of the faxes sent was high and the modem connection seemed to work reliably.

We recommend the Neuron FAX96+, pending the release of its software, for anyone willing to spend the extra money for a fast data and fax modem.

Neuron FAX96+ package

◆◆◆

A fax/modem combination that transmits at 9600 bps in either mode. Its features and bundled software make it an excellent value, and its bundled software, once released, should sweeten the package.

$1095

Neuron, 116-200 Village Blvd., Princeton, NJ 08540. 609/243-7538

by SHMUEL BROWNS

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NeXTConnection™

DOES THIS PICTURE LOOK FAMILIAR?

(WE'VE BEEN DOWN THIS ROAD BEFORE.)

We've got Connections.

Imagine this: in a small New Hampshire town, a few people get together and create an entire mail order company devoted exclusively to a revolutionary personal computer, even though many industry "experts" say it will never take off. We're talking about: ☐ PC Connection ☐ MacConnection ☐ NeXTConnection ☐ All of the above.

The answer is "All of the above." You see, we've been down this road before. Because we know—from experience—that if you offer people a truly new level of computing power, a lot of them will choose it.

Why we like NeXT: the system.

The base-level NeXTstation™—040 processor, 8 Meg RAM, 105 Meg hard drive, etc.—is more powerful than most micros will ever be. Huge applications, complex graphics, multitasking, networking—that's what NeXT™ computers were made for. And they deliver faster and for less money—than a PC or Mac souped up with all the extra memory and accelerator cards they can handle.

Why we like NeXT: the software.

Suddenly developers are able to create applications that do it all. That do exactly what you always wanted to be able to do on a computer as fast as you hoped you could do it. Like *Lotus Improv* with its multi-dimensional spreadsheet views and *Adobe Illustrator* with its true Display PostScript screens and WYSIWYG output. Plus installing software is really easy. Multitasking is really straightforward. And networking? We had our first network of four NeXTs operational in under two hours.

Chuck Milliken, Jerry Evans, and April McGuire are just a few of the people up here who will gladly talk to anyone anytime about why they think NeXT is the greatest technological innovation since the inclined plane.

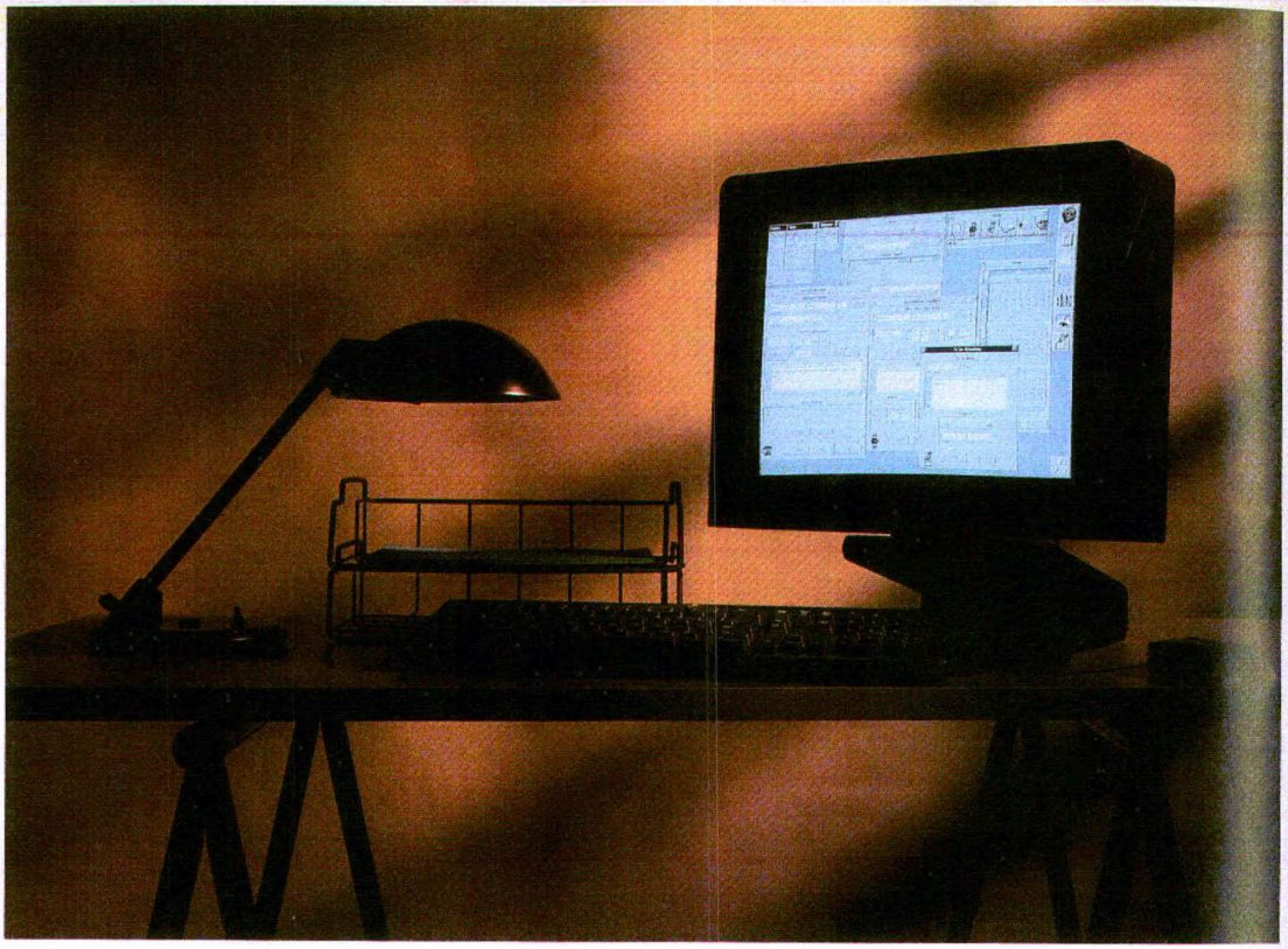
Why we like NeXT: the support.

The people at NeXT listen. And respond. In September, 1990, they reacted to criticism of the original cube by announcing a new line of machines with 040 processors, internal 2.88 MB floppy disk drives, and 2 excellent color options. All of these systems shipped within 7 months. In fact NeXT is now shipping the machine that the PC (with Windows) and the Mac (with System 7) are trying to be. And Mac and PC users are starting to make the switch.

So where do we go from here?

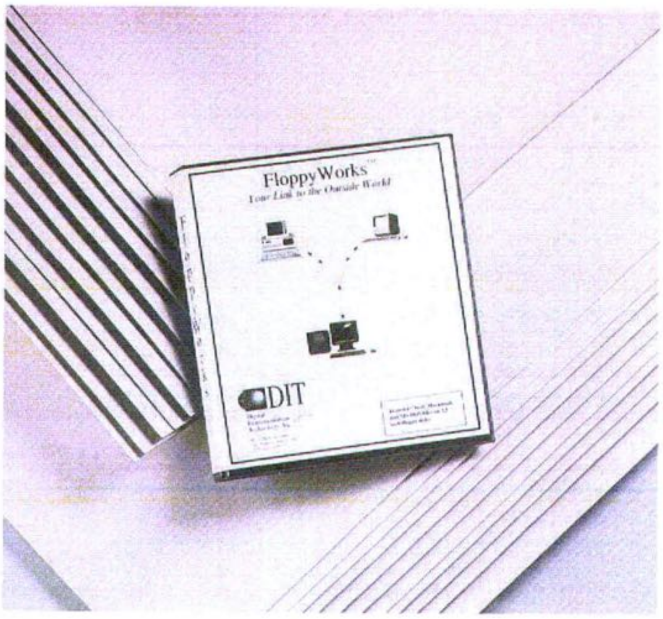
At NeXTConnection we offer a combination of low prices, super-fast shipping (in stock orders phoned in by 3:15 a.m. go out that same night for next day delivery—just $3) and a toll-free number for orders and technical support.

Like you, we're also excited about all the great new programs that are on the way, and as soon as they're ready, we'll have them for you. Just like we did for the PC and the Mac. Which is why if you own a NeXT, we'd like to be your Connection. Now. And for years to come.



C

DIT DOES WONDERS WITH DATA.



ONDUTY

The personal information manager for NeXT users. OnDuty incorporates all aspects of a personal information manager into one powerful, easy-to-use program. OnDuty gives you unprecedented flexibility in linking important names, telephone numbers, addresses, contact information, appointments, to-do items, and notes. A powerful lookup facility puts all your data at your fingertips, and its server-client database allows multiple users.

OnDuty has all the features you need to get your business day under control: a sophisticated and integrated calendar, a To-Do Manager, a Contact Manager, an Appointment Manager, a Calculator, and a Notepad. And when it's time for an accounting, OnDuty is there with a full range of ready-made reports. A data import and export facility is included.

Digital Instrumentation Technology

8657 OnDuty 1.0	$209.

FLOPPYWORKS

Read, write, and format Mac diskettes? Not only can you do that, but **FloppyWorks** also lets you transfer files easily between Mac, MS-DOS, NeXT, and OS/2 diskettes—720K, 1.44 MB, and 2.88 MB—making it an essential utility for NeXT users who need access to PCs and Macs. File transfers are a breeze—just point and click between two browsers showing files on the hard and floppy disk. And file transfer filters provide a simple means of adjusting data files for different word processing, spreadsheet, database, and graphic formats. Buy FloppyWorks alone or bundled with *CubeFloppy 2.9*, DIT's external floppy drive.

Digital Instrumentation Technology ... 1 year warranty

8656 FloppyWorks	$185.
8661 FloppyWorks *(with CubeFloppy 2.9)*	579.

Adobe TouchType
TYPE
Adobe Type Library
Plus Pack

GET MORE GRAPHIC THAN EVER BEFORE.

ADOBE ILLUSTRATOR

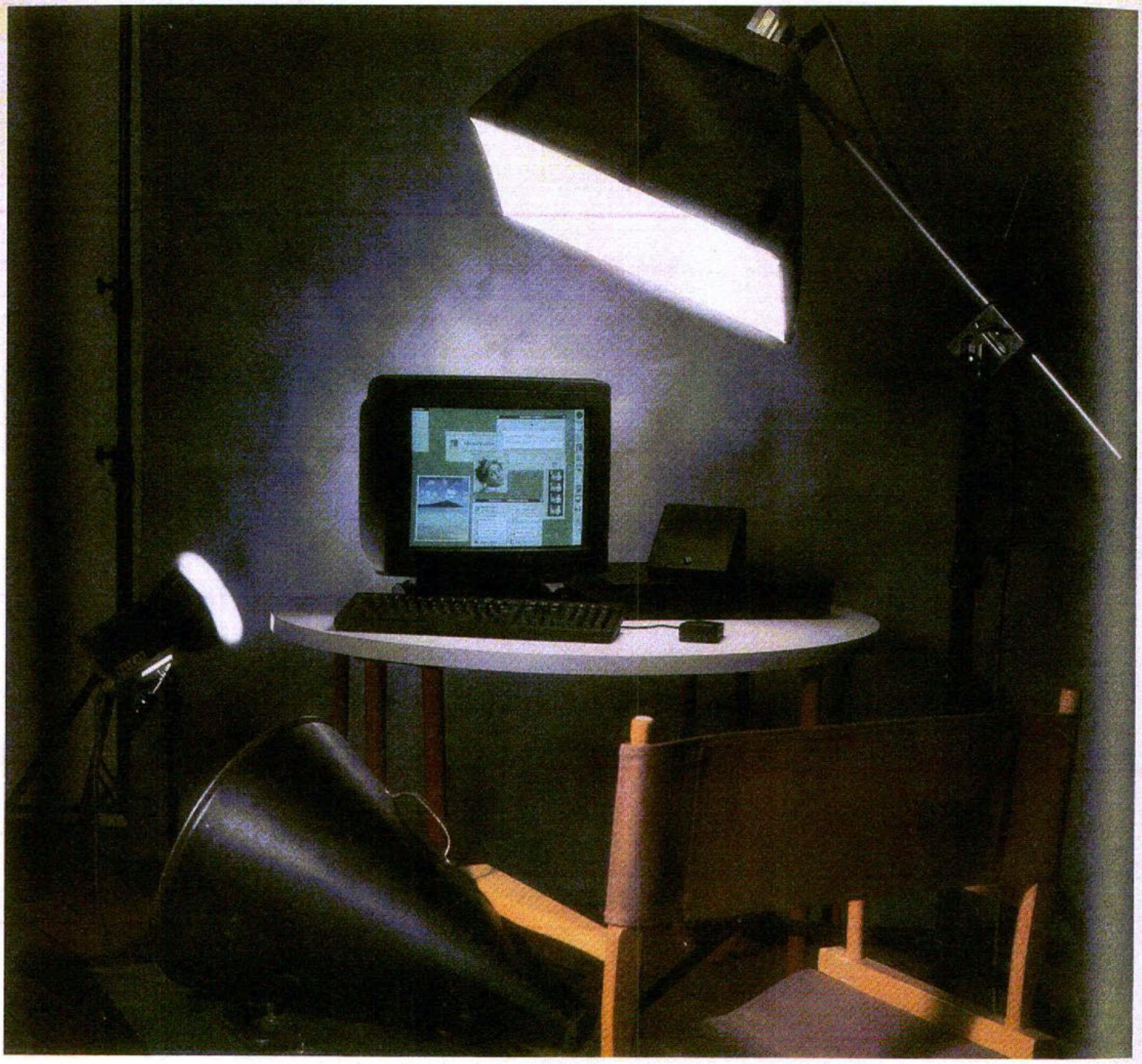
A must for anyone designing a page on a NeXT. With **Adobe Illustrator**, you can start from scratch, create grids for precision drawing, "Auto Trace" existing artwork (including color shades and hues), and/or import EPS and TIFF images. Enhance your visuals with airbrush, contour, highlight, and fill effects using as many colors as you like.

Enter and edit text directly, incorporating various typographic sizes, styles, and colors; and take advantage of sophisticated editing features like text wrap, kerning, vertical shifting, and custom letterforms. Illustrator uses NeXT fonts and color panels, so specifying type and color is easy (PANTONE support, too!). You can edit pages in "preview" or "preview selection" mode—you'll see changes instantly. And NeXT services like Mail or Librarian simplify file transfers and text searches. Overall, it's the ideal tool for business graphics, knock-out ads or flyers, and/or complex technical illustrations.

Also from Adobe, the new **Adobe TouchType** gives you expert typography in an easy-to-use interface. It's the perfect complement to Adobe Illustrator and all other applications that use or need type. Features include powerful kerning, a font selector that allows you to choose a typeface by viewing its design (rather than a list of names), and the ability to position letters anywhere on the page. And to spruce up your type collection, try the **Adobe Plus Pak** (22 popular Type 1 PostScript Fonts) and/or **Adobe Type Set Packages** (#1 and #2 are display; #3 for text faces) for big savings over buying individual fonts.

Adobe

1827 Adobe Illustrator 3.0	**$459.**
9741 Adobe TouchType 1.0	**175.**
9765 Adobe Plus Pack 1.0	**129.**
1832 Adobe TypeSet 1	**65.**
1832 Adobe TypeSet 2	**65.**
1834 Adobe TypeSet 3	**129.**



MULTIMEDIA IS THE MESSAGE.

MEDIASTATION 1.53

Lights, camera, action, sound, and more. Welcome to the wonderful world of **MediaStation**—the integrated multimedia database and authoring system. This multitasking, multiuser application package lets you capture, process, organize, store, and present high-resolution graphics, CD-quality sound, animation, video, and text. MediaStation was developed for folks who archive and retrieve media and who create computer-based training, interactive presentations, electronic storyboards, and dynamic multimedia libraries. Additional uses are possible in medical imaging, facilities management, human resources, and other fields.

In MediaStation's *Format Mode*, you design the look of your graphic interface and multimedia applications. In *Enter Mode* MediaStation accepts scanned images (and TIFF and EPS files), digitized video and stereo sound, and text files. Powerful authoring tools let you edit and annotate images, sound, and text and create cell-by-cell animation. Completed entries are equivalent to database records and can be indexed, searched, and sampled in *Browse Mode*. The *Presentation Mode* with its Script Maker feature allows you to create and play back a desktop presentation, and *Forms Mode* helps you create and save forms used to print reports with images and text.

MediaStation is fully networked. Recommended storage devices include read/write optical disks, CD-ROM, and network file servers. It also supports high-resolution scanners, DSP audio devices, video recorded with *DigitalEye*, and export of multimedia to other applications. It's showtime on the NeXT.

Imagine, Inc.

1396 MediaStation 1.53	**$799.**
1397 MediaStation 1.53 *(5 pack)*	**2995.**
1398 MediaStation 1.53 *(20 pack)*	**8995.**

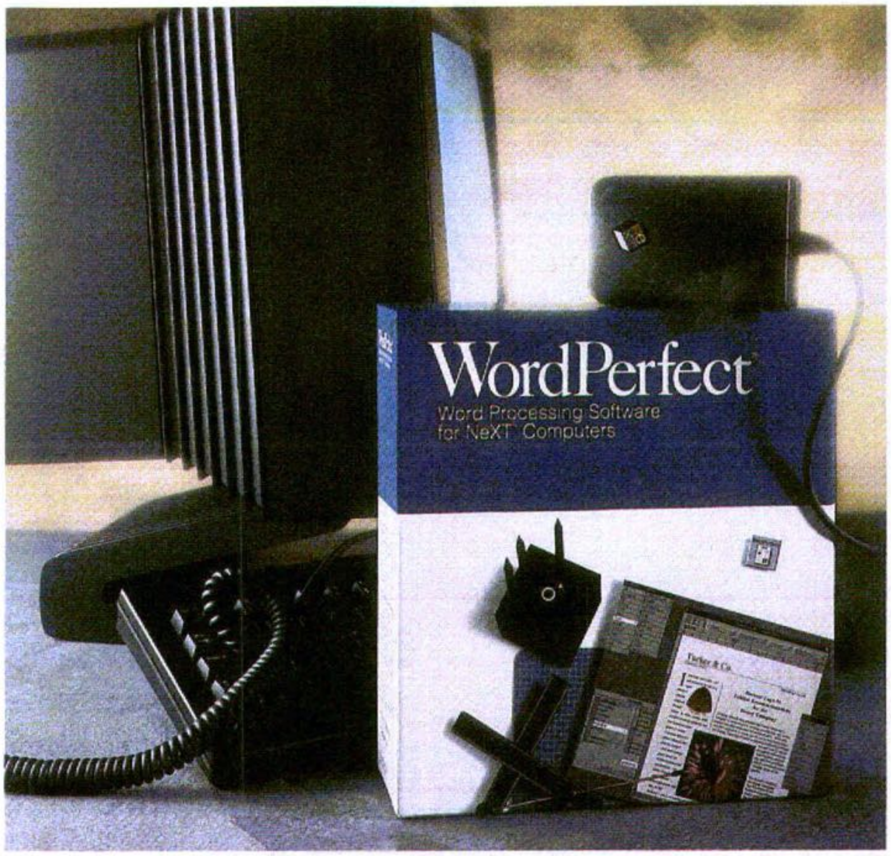
WORDPERFECT

The NeXT step in word perfection. If you want to concentrate on your writing and not your software, **WordPerfect** is just the ticket. Whatever form your writing takes: professional newsletters, brochures, correspondence, reports, or anything you care to create, WordPerfect has the features and ease of use that help keep your thoughts flowing. This full-featured word processor offers: columns (newspaper and parallel), powerful macros, merge (making mass mailings simple), table of contents, indexing, footnotes/endnotes, and much more. Questions? Ask the Digital Librarian or consult the on-line reference manual. When it's all said and done, check your work with the 115,000-word speller, or explore better wording with the comprehensive thesaurus.

WordPerfect easily integrates text and graphics, so you can turn newsletters or direct mailings into head-turners (and page-turners). You can place graphic images complete with captions or borders anywhere on a page (inserted in a line of text, tied to a paragraph, or placed in a header or footer) and scale, move, and rotate them in myriad ways. And to protect your work, the automatic timed backup will save your work at regular intervals. This is full-featured word processing for the NeXT.

WordPerfect

8818 WordPerfect 1.0.1	**$329.**
8859 WordPerfect *(5 pack)*	**1249.**
8928 WordPerfect *(20 pack)*	**3699.**

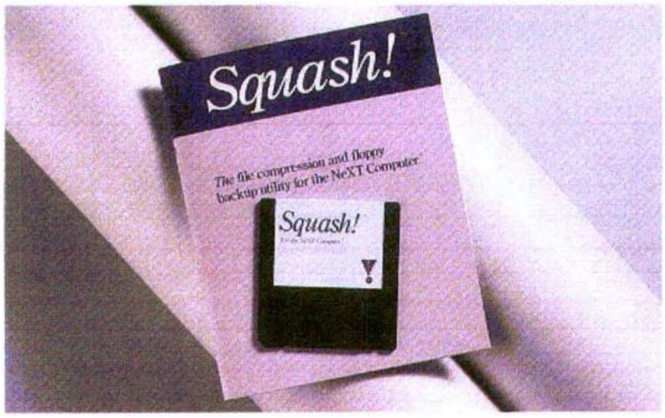


SQUASH!

The smaller the better. With **Squash!**, you can compress folders and files to a fraction of their original size. Copies of folders can be compressed onto multiple floppies, making quick backups of large folders a snap. Files can be compressed in Workspace by pressing a single command key and decompressed and opened with just a double-click. You can even have it find and squash old files at night so you wake up with more disk space in the morning! It's an inexpensive way to increase your available disk storage and backup your important data to floppies.

Agog, Inc.

1476 Squash! 1.0	**$79.**
1478 Squash! 1.0 *(10 pack)*	**699.**
1479 Squash! Educational 1.0	**49.**
1481 Squash! Educational 1.0 *(10 pack)*	**429.**


Squash!
The file compression and floppy backup utility for the NeXT Computer
Squash!

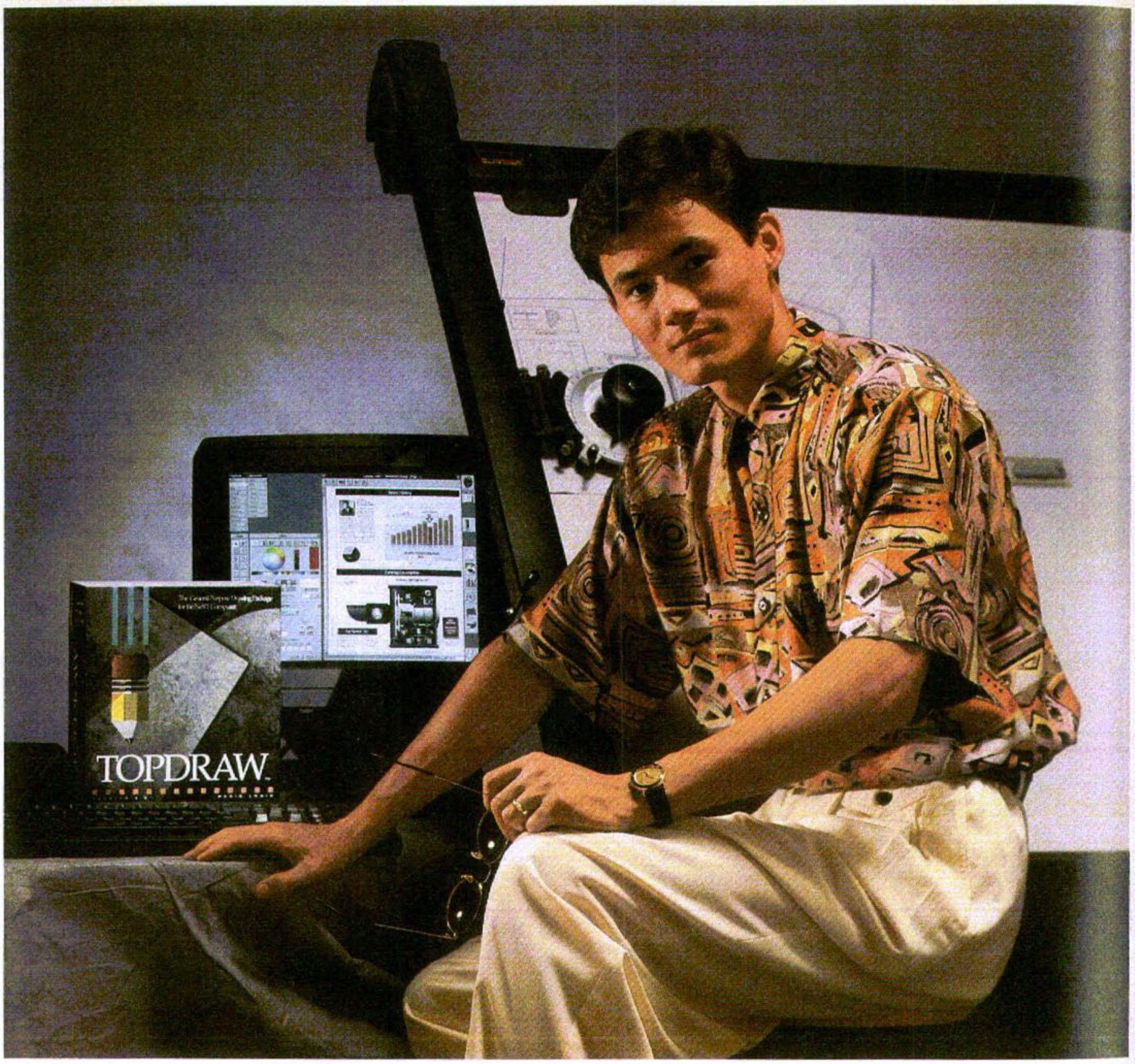
MARBLE TELECONNECT

Dial in to your network. With **Marble Teleconnect**, all the resources of a remote network (such as mail, peripherals, and databases) are available to the individual telecommuter or to the satellite office. It enables NeXT computers to run the Internet Protocol (IP)—and the thousands of software packages that depend on that protocol—over telephone lines. Teleconnect provides a significant improvement over conventional PC- and Macintosh-based communications packages, and allows NeXT users to enjoy the benefits of NeXT applications and multitasking. For example, the user can simultaneously transfer files, log on to multiple machines on a remote office network, and work with NeXT applications such as NeXT Mail, Lotus *Improv*, and *WordPerfect*.

Marble Associates, Inc.

1012 Teleconnect	**$249.**

G



POWER DRAWING FOR EVERYONE.

TopDraw

Graphics for every skill level. Regardless of your artistic talents, you'll appreciate **TopDraw**'s comprehensive graphic tools and PostScript output. Casual users can create high-impact diagrams, charts, and graphs. For advanced designers, TopDraw provides sophisticated layout and illustration capabilities, including tools for importing, editing, and integrating continuous-tone raster images.

Select design objects to draw lines, rectangles, squares, circles, ellipses, arbitrary polygons, and smoothly curved shapes—all automatically. Shapes may be filled with spot color, shades of gray, or pattern then layered, scaled, rotated, "zoomed", and skewed. Graded tones, opacity control, and user-definable dash patterns and line width are also available.

Add text in any size, at any angle, within objects, or along any path. (You can cut and paste text from *WriteNow* and *FrameMaker*.) Change fonts, stroke width, spacing, justification, and margins for individual letters or complete paragraphs. And TopDraw lets you edit text even after graphic manipulation, making sophisticated effects easy to create and change.

TopDraw imports images from a host of scanners as well as PostScript, Encapsulated PostScript (EPS), Tagged Image File Format (TIFF), Maker Interchange Format (MIF), and Rich Text Format (RTF) image files. Scale, crop, skew, rotate, and adjust raster images for brightness and contrast before they're placed in layouts. And when you're ready to show your top-drawer TopDraw graphics, mechanicals and films may be output on a range of devices, from laser printers to sophisticated PostScript color image setters.

Media Logic

9987	TopDraw 1.0C	$459.

OPTICAL & FLOPPY DISKS

Don't get caught short. One of the laws of computing seems to be that you never have enough blank disks when you need them. Well, whether you rely on 2.88 floppies or optical disks for your daily (and backup) storage requirements, we can keep you well stocked. **512 MB Optical Cartridge** are designed specifically for the 68030 and 68040 cube and have 256 MB available on each side for a total of 512 MB of storage per disk. For NeXT floppies, we have dependable **Toshiba 3½" ED Diskettes**. Just format and then fill them with all the application and data backups you need to run a nice, safe, secure operation.

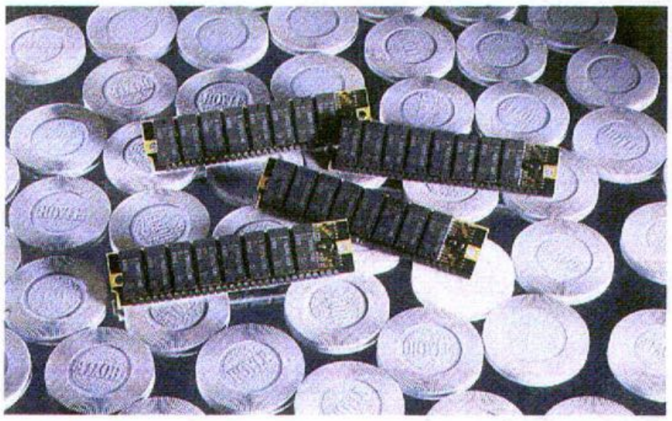
Canon ... 90 day MBG	
9811 512 MB Optical Cartridge *(MO-502m)*	**$175.**

Toshiba ... lifetime warranty	
9754 Toshiba 3½" ED Diskette *(Qty. 1)*	**8.**
9755 Toshiba 3½" ED Diskettes *(Qty. 10)*	**79.**

16 MEG UPGRADE KIT

The more the merrier. Once you start multitasking a host of high-end applications, 8 Meg of RAM can start filling up really fast. That's when it's time to get a NeXTConnection **16 Meg Memory Upgrade Kit**. It consists of four 4 MB, low-profile, non-parity, 80 ns SIMM modules that are compatible with the 68030 and 68040 cube and the 040 workstation (monochrome only). You can install them yourself in the cube (and we provide toll-free tech support), but you risk voiding the warranty if you do so in the workstation so we recommend having an authorized dealer do it for you. Either way, it's the inexpensive fast track to more NeXT power.

Memory ... 2 year warranty	
8911 16 Meg Memory Upgrade Kit	**$795.**
1935 8 Meg Memory Upgrade Kit *(for NeXTstation Color)*	**699.**



DOVEFAX

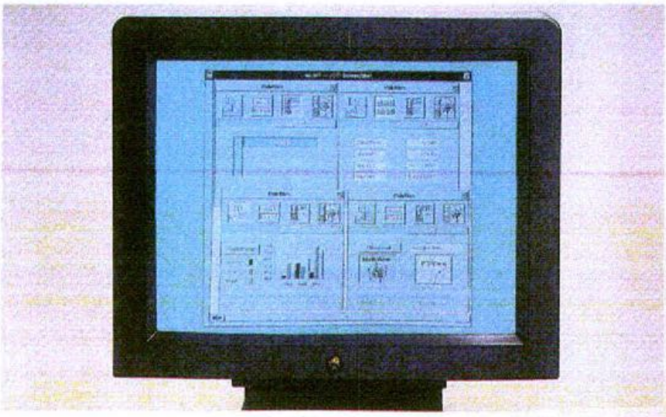
Is it a fax? Is it a modem? Yes! Yes! Whether you've got a computer-generated file to fax or data to send, **DoveFax Desktop for NeXT** has the solution. In short, it's an external serial device featuring a 9600 baud fax modem and a 2400 baud Hayes-compatible data modem. The fax features true background operation, an on-line telephone directory, on-screen display of faxes, automatic answering, customized cover pages (with graphics and text), fax preview, and Display PostScript imaging. The modem can be used with a variety of communications services, telecommunications applications, and electronic bulletin boards. It's easy to install and use and, like all Dove products, is backed by a one-year warranty.

Dove Computer ... 1 year warranty	
9356 DoveFax Desktop for NeXT *(includes 2400 modem)*	**$395.**

OT PALETTES

Increase your development power. And save money, too, by dramatically reducing programming time. Use **OT Palettes** 2.0, the first objects created by the only commercial custom palette developer for NeXT's Interface Builder. **SmartField** is an advanced text field formatting and character validation object. **Math** provides front-end development tools for *Mathematica*. **Graph** allows fully interactive graphs to be incorporated into custom applications. **Chooser** is a scrolling selection list. Call NeXTConnection for more information.

Objective Technologies	
9345 [OT Palette: 2.0] SmartField	**$650.**
9346 [OT Palette: 2.0] Math	**650.**
9344 [OT Palette: 2.0] Graph	**1259.**
9347 [OT Palette: 2.0] Chooser	**429.**



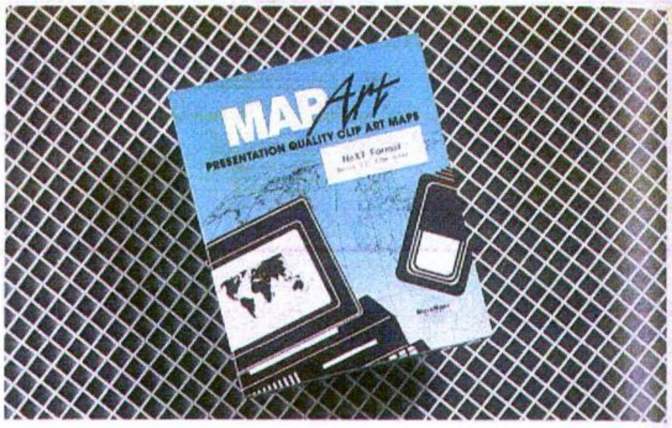
H

PERIPHERAL LAND DRIVES

Sophisticated storage solutions. PLI's **SuperFloppy 2.88** gives you the convenient high capacity of the latest drive standard along with complete read/write/format compatibility with 720K and 1.44 Meg disks. And it has a SCSI interface for easy connection to any NeXT. The **Infinity Turbo 40** won an Eddy award from *MacUser* because it combines the unlimited storage capacity of removable cartridges, the reliability of the SyQuest mechanism, and a 20ms access time that rivals high-end hard drives. There's also a two-slot **Infinity Twin** model available. So whether you need a 100%-compatible 2.88 floppy or a super-fast 45 Meg removable-cartridge drive (or both), head for Peripheral Land.

Peripheral Land, Inc. ... 1 year warranty

8547 SuperFloppy 2.88	$449.
8893 Infinity Turbo 40 MB Cartridge Drive	749.
8894 Infinity Twin 40 MB Cartridge Drive	1325.
6592 Syquest Cartridge *(40 MB)*	74.



MAPART

Maps for desktop publishing and graphic design. Imagine over 5 MB of high-quality map graphics at your fingertips! With **MapArt**, you get a comprehensive map collection that makes it easy to create attractive map graphics for brochures, newsletters, and presentations. Customize maps with *Adobe Illustrator* or import as background images in most NeXT applications. Maps feature country/state borders, latitude/longitude lines, and country/city names. Since each feature is a separate object, you can select areas, modify text, and add drop shadows and graphics to create your own design. MapArt includes four world maps, 12 regional maps of all world continents, plus detailed maps for 24 major countries that show state/province boundaries.

Micro Maps

9276 MapArt 1.0	$95.

OBJECTIVE DB TOOLKIT

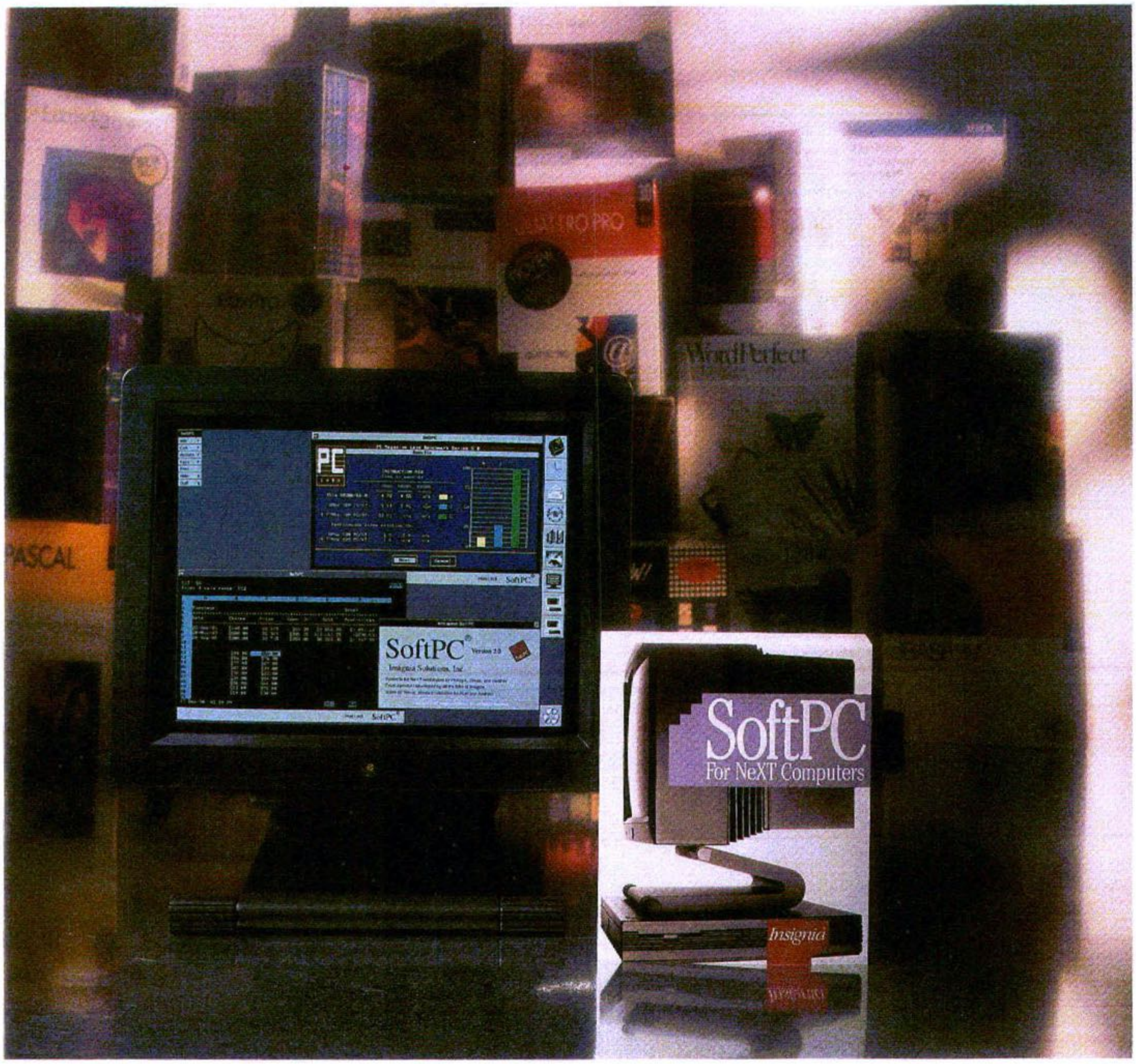
Get friendly with SYBASE. A boon for developers, **Objective DB Toolkit** fills the gap between the SYBASE database engine and applications. This versatile object library provides higher-level access to the Structured Query Language and Links the SQL Server with Interface Builder. It offers extensive templating for TextFields and mapping of palette objects to data types, letting you add functionality to data types. The Toolkit accommodates text, image, and sound data and supports pop-up lists as well as text, buttons, and slider arrays.

Field definition requires no programming and field characteristics may be modified dynamically. Each window and field may be set up to trigger specific database access or processing commands. The Toolkit also provides automatic data transfer to screen fields and generates data portions of SQL insert and update statements.

For easy manipulation of sound messages, you can associate a sound interface with database variables. And a browsing facility—loaded directly from an SQL statement—can print browser contents with no programming required. And fully multilingual applications are easily generated.

Professional Software

9357 Objective DB Toolkit 2.0	$895.



OPEN THE DOOR TO DOS.

SoftPC

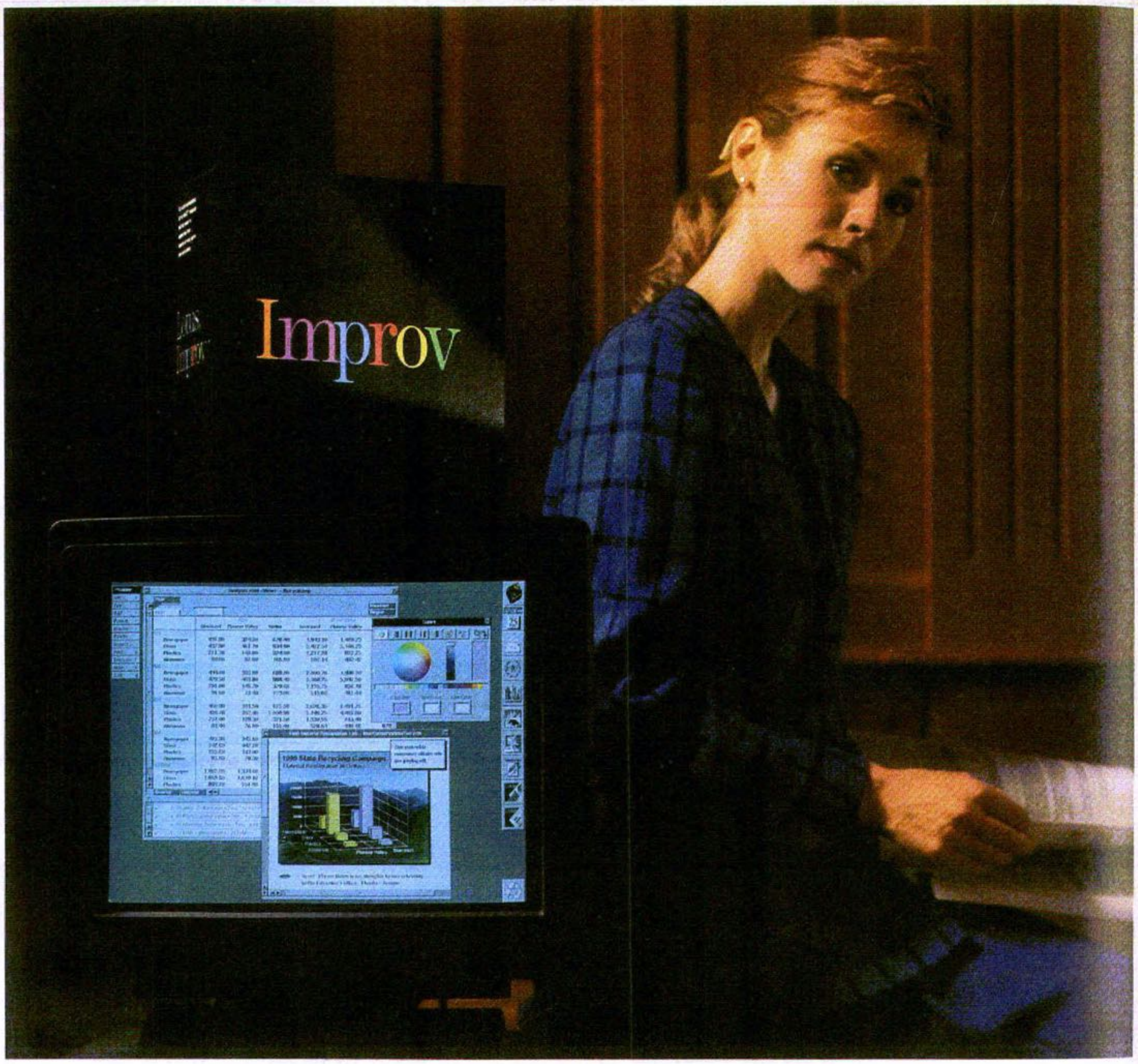
It's a PC-on-a-disk! Now you can run any MS-DOS application on your NeXT system with **SoftPC**, the software-based PC emulator. If you depend on a specialized PC program or PC datafile—or have PC-based co-workers—SoftPC can make platform hopping simple and fast. It'll also help you protect your investment in DOS software and training. As *NeXTWORLD* said, "This undertaking is so important and so difficult, and SoftPC succeeds so well at it, that SoftPC ranks as one of the most important programs for the NeXT."

SoftPC duplicates an IBM PC/AT with 80286 and 80287 processors, offering C: and D: drives, MS-DOS 3.3 (you can install 4.0), and support for EGA and CGA video in monochrome and color. There are two printer ports and two communication ports that can be directed to NeXT serial ports or to any UNIX device, process, or file. SoftPC will even transform your NeXT mouse into a Microsoft mouse on the screen.

SoftPC's special features give DOS applications a boost in performance and versatility. NeXT and DOS software can run side by side and share files as easily as copying them. NeXT modems, printers, floppy drives, CD-ROM, scanners, and other peripherals are available to your PC program. And for mega-applications, SoftPC opens up an astounding 32MB of RAM to your DOS programs.

While SoftPC will work on any system running NeXTstep 2.0, a 68040 processor is recommended. Get the power of the NeXT with the rich application library of DOS—isn't that what you've been waiting for? Well, you can have it all with SoftPC.

Insignia Solutions
1456 SoftPC 2.0 .... **$329.**



LOTUS REINVENTS THE SPREADSHEET.

LOTUS IMPROV

Look at your data in a whole new light. What happens when you give the creators of the world's best-selling spreadsheet an 040 processor, 8 Meg of RAM and let them improvise to their heart's content? You get **Lotus Improv**, a revolutionary spreadsheet for analyzing, viewing, and presenting your data in ways never before possible.

The unique dynamic views feature of Improv lets you see the same data in multiple ways to explore data relationships and prepare targeted reports. Just use the mouse to rearrange your spreadsheet and get a whole new view instantly, without any re-keying. You can actually work with 12 different dimensions of data at once, displayed in 2D or 3D format.

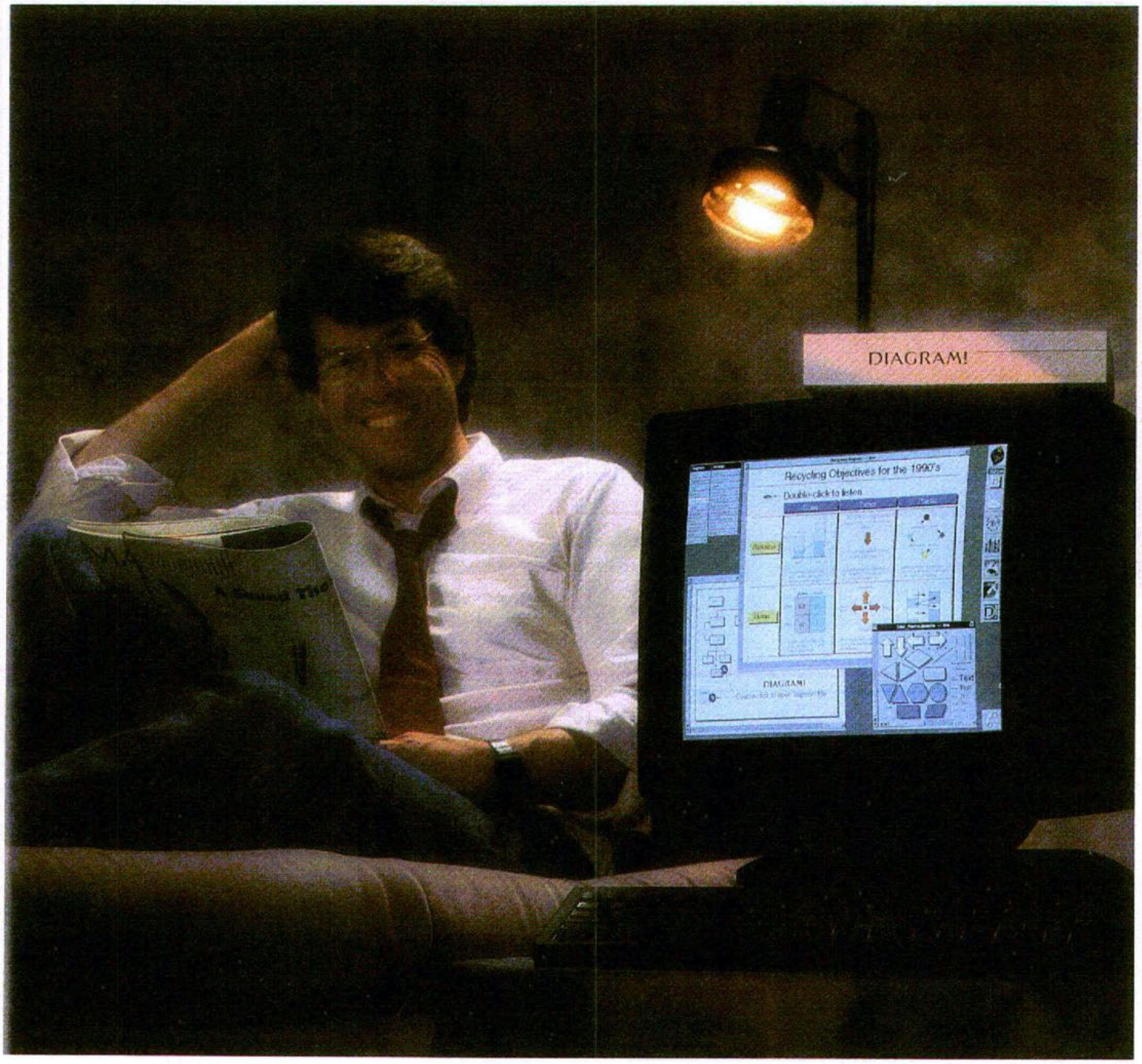
Improv lets you use plain English to define cells and create formulas (e.g., "Dollars^5 Tons x 12.5"). So your spreadsheets document themselves and are easy to modify or re-use. And for complex formulas, you can call on a host of built-in *Lotus 1-2-3*-style functions. All of which makes it easy to build spreadsheets from scratch. And you can also use the extensive collection of prepackaged templates, and/or import existing *1-2-3* files directly.

Ready to show off your stuff? Improv lets you combine graphs, texts, images, and even sound with stunning clarity and resolution that takes full advantage of NeXT.

How good is it, really? *Byte* (10/90) wrote, "Improv knocked me out." *PC World* (11/90) called it "a stunningly simple approach to organizing complex data." And *What Micro? Magazine* (UK, 4/91) awarded it "Most Innovative Product 1990."

Lotus Development
9794 Improv 1.0 .... $549.

Diag
you u
acros
of pr
draw
tions
Diagr
Word
recor
dropp
Dia


DIAGRAM!
Recycling Objectives for the 1990's
Double-click to listen

GRAPHICS FOR PEOPLE WHO USE THEM EVERY DAY.

DIAGRAM!

Diagram! packs graphics power and production. Do you use graphics in your business? To get your message across fast and with high impact? **Diagram!** is a new kind of presentation graphics package that lets you combine drawings, data, sound, and even files from other applications quickly and effectively. Just double-clicking in your Diagram! drawing will open *Improv* spreadsheets, reveal *WordPerfect* or *FrameMaker* documents, or play back voice recordings. Setting links is as easy as dragging in a file and dropping it.

Diagram! is a full-featured graphics application with all the extras to make drawing, revising, and presenting information a snap. With customizable symbol palettes, you're freed from switching back and forth between conventional tools. Instead, you point to shapes and drag them into your document. If you don't see what you need, modify your palette and you've instantly customized Diagram!. Overall, it's one of the biggest innovations in drawing technology since the Macintosh.

In addition, once you've drawn a line between objects, Diagram! takes over: "rubberbanding" lines to automatically maintain organizational charts, process flows, or decision trees—any structured drawing. That's right, this is a graphics program designed for people who *use* them every day.

By the way, you don't have to be in business to enjoy the power of Diagram!— students and universities have proven to be big fans also. Ask about the special educational discounts available.

Lighthouse Design, Ltd.

8621 Diagram! 1.0	**$339.**

Corporate Accounts Welcome

Yes, we gladly accept P.O.s. Always have, always will. In fact, we do everything possible to make corporate mail-order purchasing of computer software and peripherals as easy and enjoyable a process as possible—within the realm of common decency, of course. Many companies (including most of the Fortune 1000 and other just-as-fortunate smaller ones) have accounts with us. If you'd like to open one (or check whether your company already has one), simply call our order line at 800/800-NeXT.

PRODUCT INDEX

PUBLISHING & GRAPHICS

Item#	***Manufacturer***	***Price***
	Adobe	
	(See page D)	
1827	Adobe Illustrator 3.0	$459.
9765	Plus Pack 1.0	129.
9741	TouchType 1.0	175.
1832	Adobe TypeSet 1	65.
1833	Adobe TypeSet 2	65.
1834	Adobe TypeSet 3	129.
	Lighthouse Design, Ltd.	
	(See page L)	
8621	Diagram! 1.0	339.
8660	Diagram! 1.0 *(optical media)*	469.
	Media Logic	
	(See page G)	
9987	TopDraw 1.0C	459.
	Micro Maps	
	(See page I)	
9276	MapArt 1.0	95.
	Stone Design	
8658	TextArt 1.0	319.
8666	TextArt 1.0 *(optical media)*	549.
	T/Maker	
1185	ClickArt 1.0	195.

RECREATIONAL

	Athena Design	
9457	Culture Shock 1.0	22.

GENERAL BUSINESS & PRODUCTIVITY

	DIT ... 1 year warranty	
	(See page C)	
8657	On Duty 1.0	209.
	Imagine, Inc.	
	(See page E)	
1396	MediaStation 1.53	799.
1397	MediaStation 1.53 *(5 pack)*	2995.
1398	MediaStation 1.53 *(20 pack)*	8995.
1400	MediaStation Educ. Package	295.
1394	MediaStation Educ./Ntwk. Pkg.	2749.
	Insignia Solutions	
	(See page J)	
1456	SoftPC 2.0	329.
	Lotus Development	
	(See page K)	
9794	Improv 1.0	$549.
	WordPerfect	
	(See page F)	
8818	WordPerfect 1.0.1	329.
8859	WordPerfect *(5 user)*	1249.
8928	WordPerfect *(20 user)*	3699.

PROGRAMMING & MATH TOOLS

	Absoft	
8898	Fortran 77 3.0	839.
	Objective Technologies	
	(See page H)	
9347	[OT Palettes: 2.0] Chooser	429.
9344	[OT Palettes: 2.0] Graph	1259.
9346	[OT Palettes: 2.0] Math	650.
9345	[OT Palettes: 2.0] SmartField	650.
	Professional Software	
	(See page I)	
9357	Objective DB Toolkit 2.0	895.
	Triakis	
1966	DAN, the Data ANalyzer 2.0	269.
1965	Math++ 3.0	199.
1963	T-Calc 1.0	59.
	Wolfram	
2516	Mathematica 2.0	1295.

AUDIO & VISUAL PRODUCTS

	Metaresearch ... 1 year warranty	
9682	Digital Ears	499.
9683	Digital Ears *(with Soundworks)*	669.
9681	Digital Eye	829.
9680	Soundworks	269.

COMMUNICATIONS & DATA TRANSFER

	Marble Associates, Inc.	
	(See page F)	
1012	Teleconnect	249.
	Abaton ... 1 year warranty	
8665	InterFax 24/96 *(fax/modem)*	479.
	Dove Computer ... 1 year warranty	
	(See page H)	
9356	DoveFax Desktop for NeXT (includes 2400 modem)	395.
	Hayes ... 2 year warranty	
2307	Smartmodem 2400	349.
6655	V-Series 2400 Modem	$449.
5991	V-Series 9600 Modem	539.
7391	Ultra 9600 Modem	669.
	Intel ... 5 year warranty	
5119	2400EX Modem	179.
7880	9600EX Modem	529.
6420	2400EX MNP Modem	229.
	Prometheus	
2197	ProModem 9600N *(V.32)*	769.
2207	ProModem 24/96 NSR *(fax modem)*	339.
	Telebit ... 1 year warranty	
8907	T2500 Modem	939.

CONNECTIVITY

	Data Viz	
1823	MacLinkPlus/PC 5.0	129.
	DIT ... 1 year warranty	
	(See page C)	
8656	FloppyWorks	185.

UTILITIES

	Agog, Inc.	
	(See page F)	
1476	Squash! 1.0	79.
1478	Squash! 1.0 *(10 pack)*	699.
1479	Squash! Educational 1.0	49.
1481	Squash! Educational 1.0 *(10 pack)*	429.
	Teledia	
2513	Backup Master 1.0	249.
2514	Phrase Player 1.0	129.

DRIVES & CABLES

	Cables ... lifetime	
8906	SCSI 2-50 Pin Centronics *(4 ft.)*	45.
8992	68030 Modem Cable *(8 ft.)*	15.
8991	68040 Modem Cable *(8 ft.)*	15.
8908	SCSI 1-50 Pin Centronics	12.
8909	50 Pin-50 Pin Centronics	15.
1106	SCSI Terminator	29.
1540	Mini DIN 8 to Mini DIN 8 Null Modem Cable	15.
1441	Mini DIN 8 to DB25 Null Modem Cable	15.
	DIT ... 1 year warranty	
	(See page C)	
8661	CubeFloppy 2.9 *(with FloppyWorks)*	579.

Micropolis ... 2 year warranty

8984	280 MB Ext. Hard Drive *(15 ms)*	$1629.
8979	280 MB Int. Hard Drive *(15 ms)*	1429.
8978	550 MB Int. Hard Drive *(16 ms)*	2099.
8919	860 MB Int. Hard Drive *(15 ms)*	2949.

Peripheral Land, Inc. ... 1 yr. wrnty.
(See page I)

8887	Caddy for CD-ROM Drives	19.
8899	CD-ROM Drive	795.
8890	1.2 GB Ext. Hard Drive *(15 ms)*	4679.
8891	320 MB Ext. Hard Drive *(11 ms)*	2395.
8892	635 MB Ext. Hard Drive *(12 ms)*	4329.
8888	300 MB Ext. Hard Drive *(17 ms)*	2049.
8889	600 MB Ext. Hard Drive *(17 ms)*	2695.
8893	Infinity 40 MB Cartridge Drive	749.
8894	Infinity Twin 40 MB Cartridge Drive	1325.
8905	SCSI 2 to Centronix Cable *(50 pin)*	49.
8547	SuperFloppy 2.88	449.

SCANNERS

Abaton ... 1 year warranty

8665	InterFax 24/96 *(fax/modem)*	489.
8620	300/GS Scanner *(requires Interface Kit)*	995.
9449	Interface Kit *(for 300/GS)*	475.

ACCESSORIES

American Power ... 2 year warranty

7105	Smart-UPS 600	469.
9365	Smart-UPS 900	669.
9364	Smart-UPS 1250	879.
9366	Smart-UPS 2000	1339.
7107	Back-UPS 450	279.
7106	Back-UPS 520	329.
7105	Back-UPS 600	469.
7110	Back-UPS 800	$599.
7109	Back-UPS 1200	799.

Avery

4808	1⅓" x 4" Laser Labels *(Qty. 1400)*	24.
4812	½" x 1¾" Laser Labels *(Qty. 2000)*	7.
4807	1" x 2⅝" Laser Labels *(Qty. 3000)*	24.

Canon ... 90 day warranty
(See page H)

9811	512 MB Optical Cart. *(MO-502m)*.	175.

Curtis Manufacturing ... lifetime

1707	Ruby *(SPF-2)*	55.
1708	Ruby Plus *(SPF-2+)*	65.
5832	Ruby Remote *(SPFR-2)*	65.
5985	Safe Fax *(SF-1) (1 year warranty)*	19.
9757	Top Shelf *(TS-1)*	18.
1713	Filtered Safe Strip *(SPF-3) (1 year warranty)*	24.
1718	3½" Disk File *(DB-2) (holds 40)*	8.

Hewlett-Packard ... 120 day wrnty.

8099	Toner Cartridge for NeXT Printer	95.

Kensington ... 1 year warranty

4971	Modem/Fax Protector 20	25.
4972	Power Tree 10	19.
4973	Power Tree 20	27.
4974	Power Tree 50	54.
5577	PowerBacker 450 *(2 yr. warranty)*.	299.
5578	PowerBacker 520 *(2 yr. warranty)*.	349.
5230	PowerBacker 800 *(2 yr. warranty)*.	649.
5228	PowerBacker 1200 *(2 yr. warranty)*	829.

Maxell ... 60 day MBG

2793	DS/HD 3½" 1.44 MB Diskette *(Qty. 10)*	21.

Memory ... 2 year warranty
(See page H)

8911	16 Meg Memory Upgrade Kit	795.
1935	8 Meg Memory Upgrade Kit *(for NeXTstation Color)*	699.
9284	1 MB SIMM *(80ns, set of 4)*	189.
8790	1 MB SIMM *(80ns)*	$49.
8910	4 MB SIMM *(80ns)*.	199.

Moustrak ... lifetime warranty

8576	Black Mouse Pad *(7" x 9")*	8.
8548	Black Mouse Pad *(9" x 11")*	9.
2694	Blue Mouse Pad *(7" x 9")*	8.
2692	Blue Mouse Pad *(9" x 11")*	9.
2693	Blue Low Friction Mouse Pad *(9" x 11")*.	10.
2699	Gray Mouse Pad *(7" x 9")*.	8.
2697	Gray Mouse Pad *(9" x 11")*	9.
2698	Gray Low Friction Mouse Pad *(9" x 11")*.	10.

Pacific Micro ... 1 year warranty

8244	External Hard Drive Enclosure	469.

Safe Power Systems ... 2 yr. wrnty.

1948	PowerBacker 300	199.
4563	PowerBacker 500	419.
6747	400S Power Backup	399.

Sony ... 60 day MBG

3298	DS/HD Disks 3½" 1.44 MB *(Qty. 10)*	18.
6375	DS/HD Disks 3½" 1.44 MB *(3 pack) (Qty. 30)*.	49.

SyQuest

6592	Syquest Cartridge *(40 MB)*	74.
9728	Syquest Cartridge *(40 MB) (10 pack)*.	699.

Toshiba ... lifetime warranty
(See page H)

9754	Toshiba 3½" ED Diskette *(Qty. 1)*.	8.
9755	Toshiba 3½" ED Diskettes *(Qty. 10)*	79.

3M ... lifetime warranty

9802	DS/ED Disks 3½" 2.88 MB *(Qty. 10)*	79.

Tripp Lite ... 2 year warranty

7890	750W Battery Backup	469.
7889	1200W Battery Backup	669.
6018	LC1200 Line Conditioner.	159.
6017	LC1800 Line Conditioner	209.

OUR POLICY

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USERS

Graphic Charts in Adobe

by TONY BOVE & CHERYL RHODES

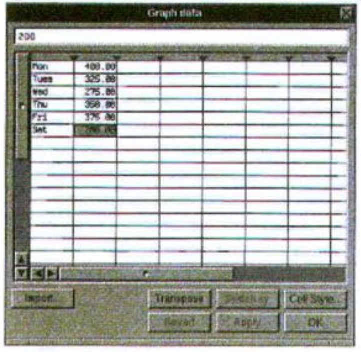
A graph works better to convey numeric comparisons than even the clearest paragraph or table – and a graph that incorporates icons or other images into its structure is better still. The graphic adds not only information but extra color, shape, and interest. A new feature in Adobe Illustrator 3.0 lets you incorporate drawn (EPS) images into graphs. This permits users to build the type of image-based infographics commonly used in major newspapers and magazines.

Illustrator version 3.0 provides six different graph styles: grouped column, stacked column, pie, line, area, and scatter. Graph data can be either typed into a table provided by Illustrator or imported from a spreadsheet or database file, and graphs will update automatically if the data changes.

The simplest graph

The graph tool at the bottom of Illustrator's tool palette starts on the grouped-column graph style. Clicking the arrow next to the graph tool reveals other styles to choose from. You can also choose styles from the Graph Style option in the Graph menu.

To create a grouped-column graph from scratch, open a new file with no template. When the window opens, select the graph tool and drag diagonally across the drawing area to define the size of the graph. A Graph Data window opens, letting you enter data into a ready-made spreadsheet structure. Start by entering the data shown in Figure 1. When you're finished, click OK.



200

Mon	400.00
Tues	325.00
Wed	275.00
Thu	350.00
Fri	375.00
Sat	[illegible]

Figure 1. **Illustrator's Graph Data window appears automatically when you select a graph type from the tool bar. Enter these values to create the graphs in these examples.**

The result is a simple bar chart with labels on the x and y axes (see Figure 2). You can see how the graph will look when printed by using the Preview Illustration view, chosen from the pop-up list at the bottom of the Illustrator window. While the graph is still selected, you can make changes to it, such as changing the data used for the graph (by choosing Graph Data from the Graph menu), or changing the type size of the text in the graph (using the Size command in the Type menu). You can also edit specific parts of the graph, changing the size of some text, or changing the pattern or paint style of a section. You'll see how later.

Graphs plus graphics

In Illustrator 3.0, you can enhance the simple bar chart you've just created by using graphic objects in place of the bars. Any EPS object can fill columns of a bar chart or be used as markers in line graphs and scatter charts.

Now that the graph is drawn, you temporarily leave the graph window and prepare the graphic that you'll be using in your chart. To do that, open the file of the graphic you want to use and select the object, either by using Select All in the Edit menu or by dragging a selection marquee around the object with the selection tool. (We're using a graphic of a coffee cup for this example. You can use any Illustrator document you have handy.) Then choose Group from the Arrange menu, and, with the rectangle tool, draw a rectangle around the object to define a bounding box, which tells Illustrator to use the entire image. Paint the rectangle with no fill and no stroke (using the Paint Style command), and use the Send to Back command in the Edit menu to place the rectangle behind the object.

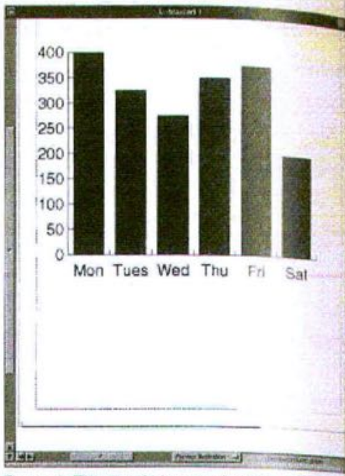


Figure 2. **This simple bar graph will be embellished with graphics using Illustrator's direct-selection tool and an EPS file.**

Next, select the bounding box and image and use Group to group them. Choose Define Graph Design from the Graph menu, and click the New button. A small preview of the design appears, and you can save the altered object under a new name.

Direct selection

Graphs are organized into subgroups. You can make changes to individual sections of the graph in two ways. You can ungroup the segments of the graph and manipulate the segments individually, but the ungroup operation also deactivates the connection between the graph and the underlying data so that the graph will not be updated when the data is changed. It's best to leave a graph grouped and use Illustrator's direct-selection method, which is designed to let you keep the graph elements grouped. You'll use the direct-selection tool to select the bars of the graph and assign a graphic design to them.

Click the arrow to the right of the selection tool in the tool bar and choose the white arrow – the direct-selection tool. Then hold down the Alternate key while you click on one of the columns of the graph to select a path. Alternate-click the same column again, and the related columns in the graph are automatically selected.

Now choose Use Column Design in the Graph menu and select the name of the design you just created. In other parts of the panel you can choose to scale the design vertically, to scale it uniformly, to repeat the

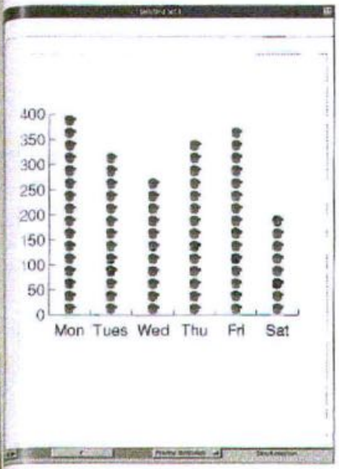
USERS

NeXT Question

by DAN LAVIN

Q: My mailbox keeps getting larger and larger, and deleting old messages doesn't seem to help. My home directory is starting to resemble the judge's desk from *Miracle on 34th Street.* Help!!!
Robert Sibley
San Francisco, CA

A: *When you delete a mail message, it disappears from your screen, but it's saved in the mail file, in case you want to retrieve it (with the Undelete command), much as with the recycler. To get rid of the deleted messages for good, select Compact under the Utilities menu item in the Mail application. This will save valuable space and speed up the mail application.*



gure 3. **We've used coffee cups for the bars a graph that shows coffee sales during one eek.**

design, or to set up a sliding design (in which only part of the object is scaled). For the coffee cup graph, we'll choose to repeat the design and set the design increment to 25. (We'll keep the defaults for the other settings.) You'll see the result in the Preview Illustration view (see Figure 3).

Different styles

One experiment you might want to try is changing the graph style. For example, you may want to present these numbers in a line graph. One of Illustrator's tricks is to use a design object to mark the data points in a line or scatter graph.

First, choose the regular (black) selection tool and select the entire bar raph. Then choose Graph Style from the Graph menu and select the Line raph style. A dialog box appears that shows various options and styles r line graphs. You may want to change the left axis range to 0 to 400 ather than 200 to 400 – click the Use Left Axis button in the Axis section f the Graph Style panel and then the Left... button to change this range. hen click OK.

Next, scale each marker on the line graph so that the marker is an ppropriate size; otherwise, you won't see the graphic, which is initially et to be the same size as a regular dot marker. Use the direct-selection ool to select the first marker, then lternate-click the first marker to elect all markers. Select only the arkers, not the lines of the graph.

Now choose the Use Marker esign option in the Graph menu, ick the On data point option and e name of the design, and click K. The result can be seen in the eview Illustration view (see Figure . Note that we've added labels to nish the graphic.

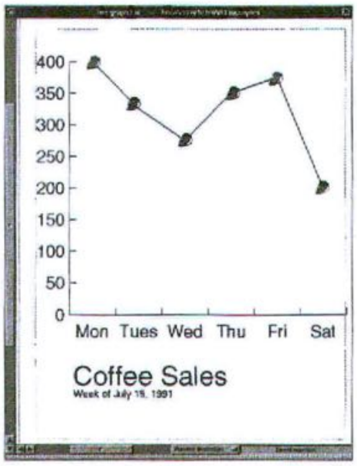


Figure 4. **Using the same numbers and illustration in a line graph creates a different view of the data.**

You can use Illustrator's drawg and selection tools to modify e artwork and customize the aph. Just remember to use the rect-selection tool in order to keep e objects grouped. Any art director will tell you that coffee consumption bound to change just before a deadline; using direct selection ensures at you can change those numbers in your graph data window at the last oment and have the graph automatically update, with all your special ects intact. ◆

ONY BOVE AND CHERYL RHODES *publish and edit a nthly industry newsletter,* Bove & Rhodes Inside Report on Desktop blishing and Multimedia. *Bove and Rhodes have written many books out multimedia computing and desktop publishing.*

USERS

Hints and Tips

by CHUCK FARNHAM

Illustrator 3.0

Changing colors globally To quickly change a color anywhere it appears within a document, use custom colors to fill your objects. The custom color can easily be edited with the Custom Color command in the Paint menu. The changes will apply to all objects filled with that color.

Kerning To quickly obtain kerning and tracking information about specific characters within text blocks, select them with the text tool and then hold down the Alternate key. The kerning and tracking information will be displayed in the Info Bar.

Graphic tabs You can create graphic tabs for text blocks. Create a text box by clicking and dragging with the Text tool. Then, using the Pen tool, draw a vertical line (using the Shift key to constrain) or a nonvertical line where you would like the tab to be. Select both objects, then choose Make Text Wrap from the Type menu. Now when you enter or import your text, you can easily tab to the line.

Improv 1.0

Using groups and categories Whether you are creating a new model or modifying an old one, it helps to know how groups differ from categories in an Improv worksheet. To know which type of grouping to use, think about how you plan to use the worksheet model and which features have the highest priority.

For new Improv users, it's often confusing to decide whether to use categories or groups. Use the following rules to help you decide.

Use Groups if:

- Different groups can contain different numbers of items.
- You need to create unique combinations of items.
- You need a summary, such as total or average. Improv automatically creates the formulas to calculate these summaries.
- You want to be able to collapse or expand the information.

Use categories if:

- Every case will have the same structure of items.
- Items in different cases are calculated with the same formula.
- You need to be able to rearrange a view layout.

WordPerfect 1.0

Graphics Once you import a graphic onto a page, it almost always needs to be manipulated in some manner. With WordPerfect, once you have pasted the item onto the page (and while it is still selected), Command-click the graphic. This will bring up the Graphics Inspector, which gives you control over page alignment, backround shading, 360-degree rotation, mirror imaging, and other manipulation tools.

CHUCK FARNHAM *is a hardware-support engineer and consultant specializing in teaching computer skills to individuals with developmental disabilities.*

DEVELOPERS

Designing an Icon

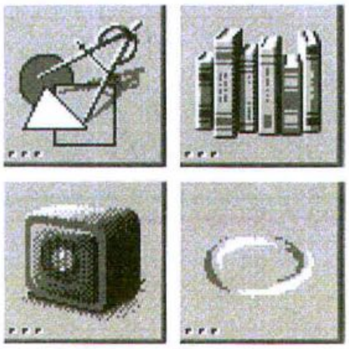
by KEITH OHLFS

An application's "look and feel" begins with the first thing the user sees: the icon. Icons are a vital visual element in the NeXTstep user interface; they are used in the File Viewer, dragged in and out of programs, visible within many panels, and sent back and forth in electronic mail. The icon is the application's logo; it should establish an identity for the application it represents. The best icons in the NeXT interface leave the user with an impression of what the application is all about.

In addition to purely aesthetic considerations, icon designers need to pay attention to an icon's effectiveness and its appropriateness to the NeXT user interface. A look at several existing logos shows examples to follow and mistakes to avoid.

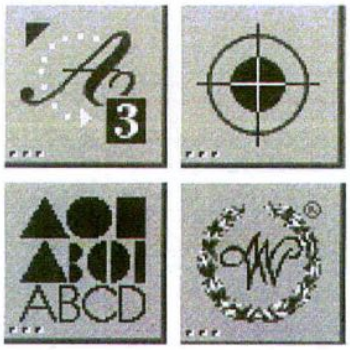
Color and contrast

The 2-bit NeXT user interface supports four shades of gray: white, light gray, dark gray, and black. Icons are usually displayed on a light gray background. It's a good idea to use white highlights and dark shadows to build contrast and enhance the icon's visibility. Careful shading and rendering can result in a three-dimensional effect that can visually pop the icon off the light gray background. Draw, Librarian, and SoundPlayer are examples of icons that use these effects well. On the other hand, the TopologyLab icon is flat because it uses light colors and has no black to give it needed contrast.



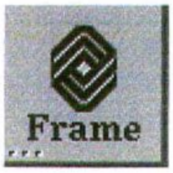
Often, the most elegant designs are the simplest ones. Icons don't have to be three-dimensional to be effective. Illustrator, Separator, TouchType, and Webster are examples of elegant and simple two-dimensional design.

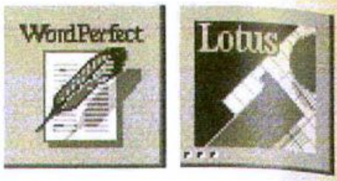
Gray pixels can be used to anti-alias (smooth) the edges of jaggy parts of images, as in Adobe's Illustrator and Separator icons. The TouchType icon is a nice design, but using anti-aliasing to fix the jaggies in the lower half of the image could make the icon look even better.



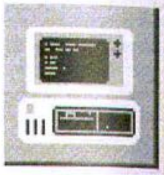
Graphic strengths

Text isn't necessary in an icon; it's more important to establish a visual identity than to include the product or company name. Because the File Viewer displays the program name under the icon, the name within the icon is redundant. In many cases the name takes up space that could otherwise be used to enhance the graphic. The name "Frame" in the FrameMaker icon detracts from Frame's nice logo, which would be more effective if it used the entire box. You see the same effect in the WordPerfect icon (which has a weaker graphic to begin with). Incorporating the name into the design is a better method. The Lotus Improv icon is a good example: Instead of conflicting with the image, the "Lotus" name complements it.

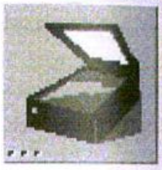




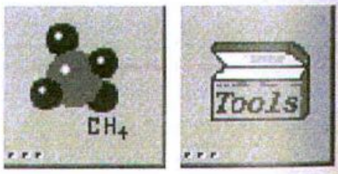
The transparency (or "alpha") of an icon affects how the icon highlights when the user clicks on it, as well as what it looks like when it is dragged around the workspace. Partially transparent icons highlight better because more of the white highlight shows through the icon. Transparency also lets the user see what's underneath an icon when it's dragged; a folder may be opening, the recycler may be spinning, and so on. Since the highlight color is white, it is important that an icon not contain too much white. The SoftPC icon is an example of an image that's hard to see when it's highlighted.



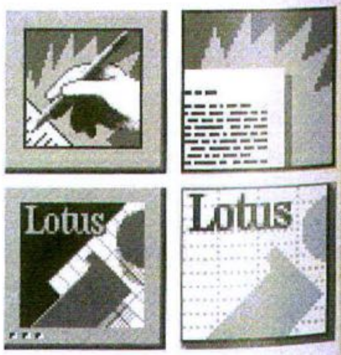
Other mistakes are purely graphic. The Scan-X icon, for example, suffers from poor rendering. The perspective of the scanner is not correct, and the shadow is awkward and cut off by the icon's boundaries.



Another common mistake is poor composition. The icon should fill out the 48-by-48-pixel area of the icon block. The two icons shown at the right are dwarfed by the text and icons around them when viewed in the File Viewer or the dock.



Document icons are as important as application icons. You usually have only one copy of an application, but you could have hundreds of files from that application, so the file icon could be scattered throughout the File Viewer. The look of the document icon should be similar to that of the application icon, visually tying the two together, though the file icon may look more like a document or other product of the application. WriteNow's and Improv's document icons are good examples of effective icons that fit these rules.



A poorly designed icon can be damaging for a new product, making the work look amateurish. Most of the applications on the NeXT have benefited from the input of professional designers – and have found it well worth the investment. Your application icon represents your program in the workspace that the user faces all day, and that's a powerful marketing opportunity for your product. ◆

KEITH OHLFS *designed the NeXTstep user interface.*

DEVELOPERS

Hints and Tips

by Andrew Stone

Emacs in edit

Did you know you can use Emacs-like commands in Edit? My favorites are these:

Control-A	Move to start of line
Control-E	Move to End of line
Alternate-B	Move back one word
Alternate-F	Move forward one word
Control-D	Delete next character
Command-1	Select Line

For a complete list, see page 3-17 of the *NeXT Development Tools* documentation.

Emulating the AppKit

If only one object of a class is needed by your application, you can easily emulate the AppKit convention of using [ObjectClass new] to get at this object from anywhere in your code and guarantee that only one of these objects is produced. The OpenPanel and SavePanel are examples of this kind of object.

Here is an example for a TimeMonitor class, an object which can alert the user to the progress of some time-consuming event. Since only one such event can occur in a program that doesn't use Mach threads, we need only one time monitor.

```
@implementation TimeMonitor:Object

static id theMonitor = nil; // just one per class + new
{
    if (!theMonitor) {
       theMonitor = self = [super new];
       [NXApp loadNibSection:"TimeMonitor.nib" owner:self
          withNames:NO fromZone:[self zone]];
     // perform initialization of objects here
     // where you are guaranteed their existence
    } else self = theMonitor;
    return self;
}
```

Don't ever forget the second part of the "if" statement, or truly weird things will happen. Now, whenever you need the time monitor, you can use this statement:

```
timeMonitor = [TimeMonitor new]; // just like the pros
```

An ounce of prevention

Compiler warnings are your friend; heed them carefully.

It's basic, but important. You're in for a lot of misery if you use a function that returns a float value but has not been prototyped in the file where it is used. The GNU Objective C compiler with NeXT modifications casts implicitly declared functions as returning type id (or void *). This type is the same size as a long int now (32 bits), but it's sure to break your code if this changes. Your float function will produce garbage, although the value looks perfectly valid "leaving" the float function.

The default NeXT **makefile** used by Interface Builder **(/usr/lib/nib/app.make)** specifies use of the cc flag **-Wall**, which warns you if a function is used implicitly, if its return type is different than the prototype, if a variable is unused (nuke these), or if an automatic variable might be used uninitialized.

If you always address the compiler warnings, any new warning can be easily heeded and this pitfall avoided.

Got a hot tip? E-mail andrew@nextworld.com or call 505/345-4800. ANDREW STONE *is a principal in Stone Design, publishers of the Create! and DataPhile applications for the NeXT.*

DEVELOPERS

NeXT Question

by Pascal Chesnais

Q. Is the C++ shipped with the NeXT different than the C++ shipped with other platforms?

From Frequently Asked Questions (FAQ) at MIT

A. *The C++ shipped with the NeXT 2.0 is actually "NeXT Release 2.0 (v31.1) – GNU version 1.36.4 (based on GCC 1.36)."*

*This version doesn't include **libg++**; you need to compile it. (GNU software is available from the Internet archive **prep.ai.mit.edu.**)*

You should be aware of two things about C++ on the NeXT. First, any C include files have to be specified as below:

```
extern "C"
{
 #include <libc.h>
 #include <stdio.h>
 #include <stdlib.h>
 #include <math.h>
}
```

This tells the machine that the code is C++, so you won't have problems with the standard libraries thinking your program is Objective C.

*The second difference is that the **/usr/include/stdio.h** in line 75 has a variable **new** that conflicts with a C++ keyword. You can redefine it using these lines:*

```
#define new __new__
#include "stdio.h"
#undef new
```

*These two fixes enable you to run C++ programs that do not use the C++ class library and therefore do not need **libg++**.*

PASCAL CHESNAIS, *a reasearcher at the MIT Media Lab, publishes FAQ on the comp.sys.next newsgroups.*

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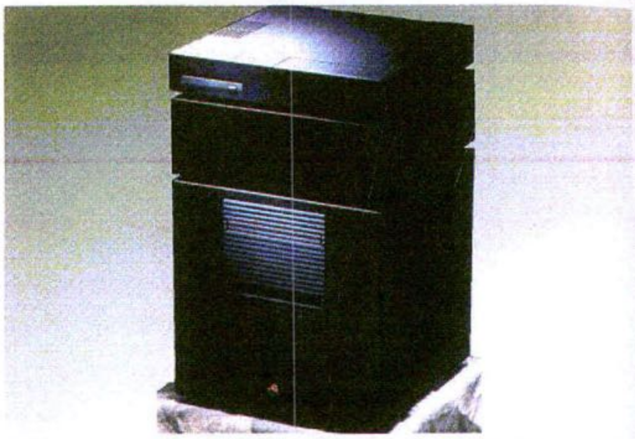

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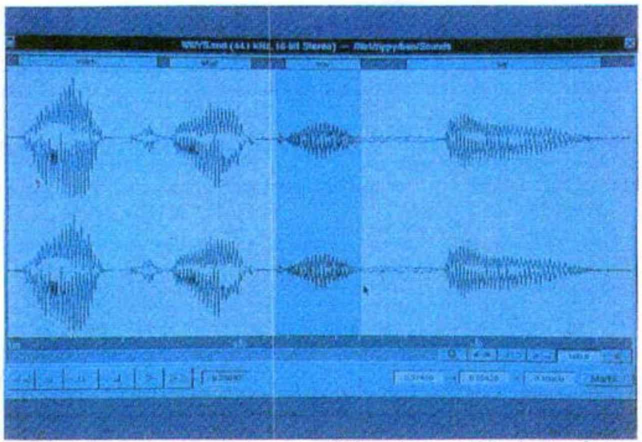

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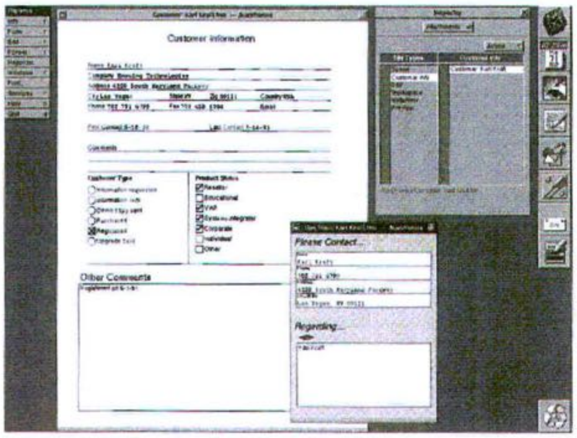

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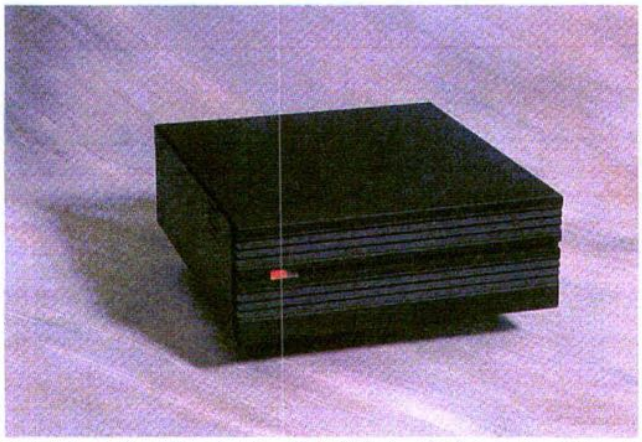

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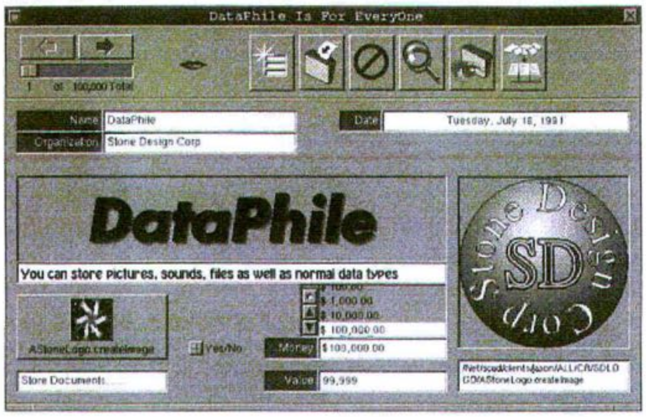
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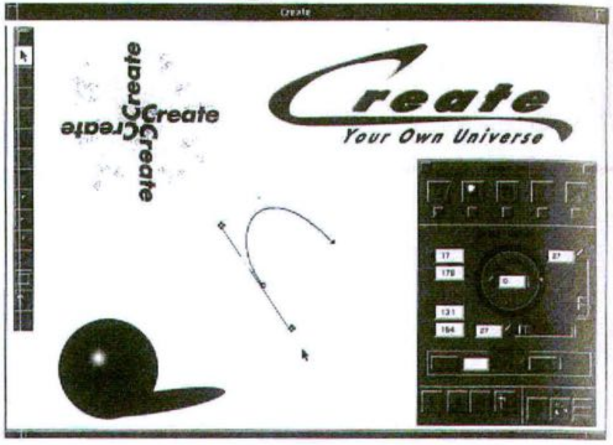

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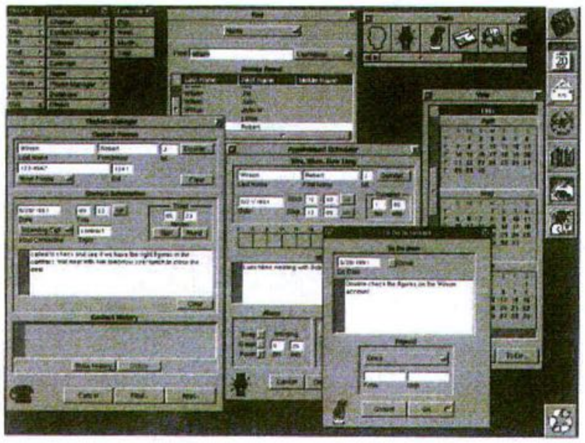

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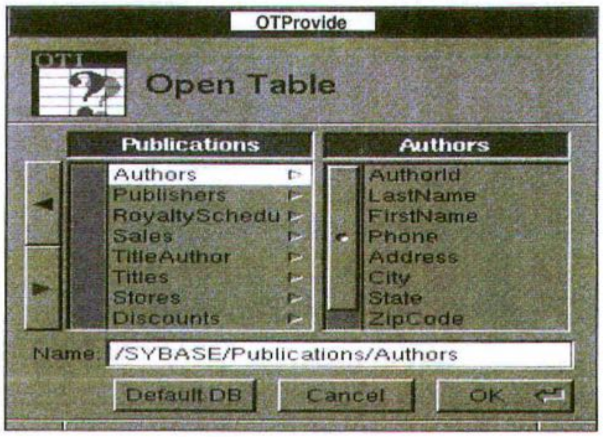

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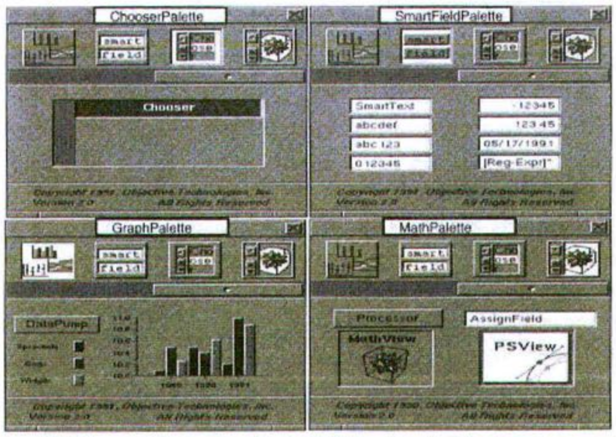

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Don't Worry, Be Happy

STEWART ALSOP

First it was a gaggle of workstation vendors lining up as the Open Systems Foundation. Then we had another gaggle proclaiming the Advanced Computing Environment (ACE) alliance. The real mind-blower came a few months ago when Apple and IBM allied around an object-oriented operating system that they will propose as a new standard.

This outbreak of alliances among the power players of the computer industry is focused on the emerging intersection between PCs and workstations. What does it all mean for NeXT, which has already staked out that territory?

You can look at the PC-workstation intersection in two ways. Personal computers appeal to customers by solving their problems and making them feel comfortable. Workstations appeal to customers because their performance provides a competitive advantage in mission-critical applications. While the technology may be similar, the appeal to customers is entirely different. In that light, ACE systems are clearly workstations, intended to compete with Sun, while the Apple-IBM platform is intended to be the personal computer successor to the Macintosh and PS/2.

To consider whether a new platform will be successful, you have to ask: What is it that motivates customers to adopt a new platform? What must it have to make the customer happy?

First of all, a customer has to be confident that the platform has some staying power. Second, there has to be some new value in the platform, something that does not exist in previous platforms and that customers can use to do something that they want to do.

With ACE and Apple-IBM, let's assume that the market power of the alliance partners guarantees some staying power. But what is their new value?

When I ask that about ACE, I can't figure it out. Okay, they have a RISC chip. So does Sun. So does HP. So does IBM. RISC in itself doesn't have any value because everybody's got it. Same thing for the OS. Open Desktop looks pretty much like any other version of UNIX. And the things Microsoft has defined as valuable in Windows NT are exactly the same things that are already being delivered in UNIX.

The only thing that might be of value in some way is that MIPS has a 64-bit chip. That sounds like a unique differentiator, but we've been through this before. We went from 8 bits to 16 and from 16 to 32. If it turns out that a 64-bit chip is important, other people are going to get it, too. So I look at ACE and I don't see where the happy customer is.

When I look at the Apple-IBM alliance, I do see happy customers. The new value in this platform is the object-oriented operating system. Of course, everybody claims to be object-oriented, but the fact is that right now we don't have any operating systems that are truly object-oriented – with the possible exception of PenPoint.

There's something about the notion of object orientation that is really important: It creates a system that is theoretically infinitely extendable. It gives the user control over the system that they've never had before, by truly enabling user programming. It also makes software developers happy because they can make software that is reusable. These are fundamental benefits. These are things that really motivate people.

Now we come to NeXT and look for its happy customers. Does NeXT make happy customers?

NeXT's original Cube demonstrated that NeXT had a vision for its architecture that was differentiated and unique. The NeXTstation demonstrated that the architecture had a future. It also has great software. If you add up Improv and TopDraw and Live Wire and Pages and the Boss Document Management System and Diagram! and others that I haven't seen, you get a pretty good collection of unique software.

On top of all this you have NeXT's software, particularly Interface Builder, one piece in NeXT's own approach to object orientation. Another is its new DBKit database object that lets you develop applications with distributed SQL databases without programming. NeXT needs to go farther in this direction and evolve the Mach OS itself into a full object-oriented system, but fortunately it has a few years to do that.

That's the plus side for NeXT: It is a differentiated platform. It has software that is meaningful. It has a strategy and a point of view about computers. And it is becoming a serious company in terms of sales – upwards of $50 million in revenues last quarter is more than respectable.

On the minus side is the marketing problem. Is NeXT a PC or a workstation? I think NeXT does itself a disservice talking about professional workstations and some murky concept combining the two. The value of the NeXT machine is the same basic value that PCs have had since the beginning. It benefits individuals, and by benefiting individuals, it benefits the organization. I have heard it said that Steve Jobs specializes in just-in-time marketing, so I figure that by the time NeXT has ACE and Apple-IBM to contend with, NeXT will identify itself as a personal computer – just in time.

A more fundamental problem is NeXT's microprocessor architecture. The 68000 architecture is too far down its evolutionary path. The Motorola architecture is getting too complicated, and it will take Motorola too long to deliver new iterations.

I think NeXT is going to have to switch processors, which makes a real software compatibility problem for customers. There are all sorts of possibilities, but the problem is that getting on any other chip means you have to recompile all of your software.

I don't know the answer to that problem, which to me is the fundamental issue that NeXT now faces. If the company devises a solution that leaves the customer happy by providing continuity and increased power, then all its other advantages leave NeXT with a very bright future, ACE or no ACE. Apple-IBM or no Apple-IBM.

STEWART ALSOP *is accustomed to switching hats. He is editor and publisher of* P.C. Letter, *host of the Agenda and Demo industry conferences, and editor-in-chief of* InfoWorld, *among other things.*

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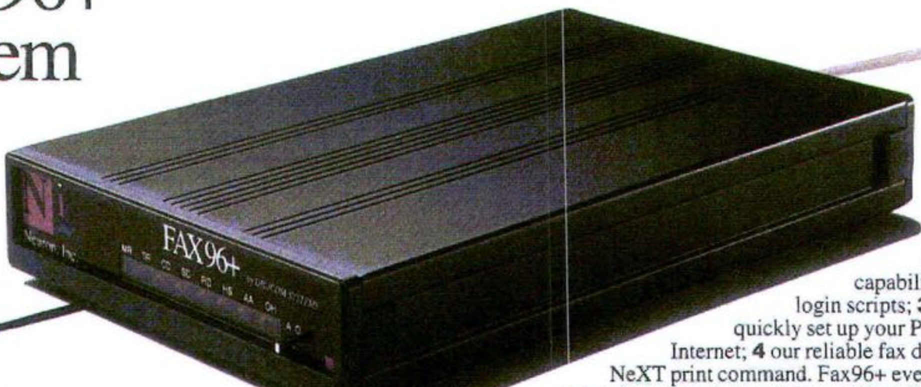

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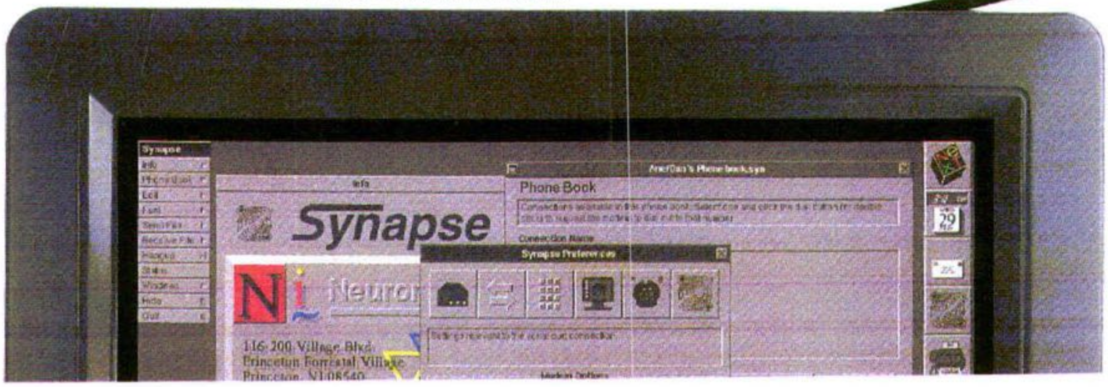

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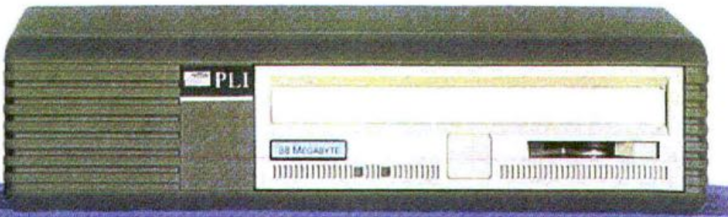

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EXTRA

SEPTEMBER 1991

NEWS IN BRIEF

Frame Technology is now shipping a new version of the leading page-layout program for the NeXT platform. FrameMaker 3.0 offers a robust new tables package that integrates completely with the FrameMaker environment. Another new feature called Conditional Text allows you to simultaneously prepare multiple versions of a document by flagging sections and assigning conditions for omission and inclusion by version. Color PostScript output is finally supported, and completely new documentation is offered. FrameMaker 3.0 costs $995 (on floppies only) plus an optional $195 for 13 international dictionaries. Upgrades for registered users are $150. Phone 408/433-3311.

Steve Jobs, president and CEO of NeXT, has been named as one of 28 private-sector members of the President's Export Council, which advises the President on government matters affecting international trade. Jobs was chosen because of his "exemplary entrepreneurial role" and "outstanding leadership" in computers and technology, said Robert A. Mosbacher, secretary of the U.S. Department of Commerce.

Quark has put out official word that it has dropped development of its XPress page-layout program for NeXT. In response to inquiries from users, Quark replied with this written explanation: "The decision to support a platform is based on a number of factors, most notably the system's penetration into the professional publishing market. To date, NeXT has failed to make any real inroads into these areas. If this were to change, we would, of course, re-evaluate this decision."

Hayes Microcomputer and Marble Associates have collaborated to permit NeXT computers connected by modem to communicate with each other as if they were connected to the same LAN. The new Hayes adapter lets the NeXT connect at 38,400 baud through standard phone [SEE BRIEFS, PAGE 4]

WriteNow spun out to software start-up

New company plans full line of NeXTstep apps

by DAN RUBY AND DAN LAVIN

Redwood City, CA – In a move bearing some similarity to Apple's creation of Claris in 1987, NeXT this month granted an exclusive license to the NeXTstep version of Write Now and unspecified rights to other NeXT software to a start-up software publisher.

The new company, which was not yet named at press time, will begin selling WriteNow on October 1, the same date the word processor will be unbundled from the NeXT system. According to Randy Adams, president of the new firm, the company plans to be a major publisher of NeXTstep applications, with offerings in all major software categories.

"NeXTstep is our only business. We exist to help build the NeXT platform," Adams said.

Adams is the former president of Emerald City Software, which was sold last year to Adobe Systems. He was also formerly a NeXT [SEE WRITENOW, PAGE 2]

WriteNow's checkered past

1983	**MacWrite for as-yet unannounced Macintosh is late. Steve Jobs contracts with Solaster of Seattle to write another word processor as backup.**
1984	**Apple finishes MacWrite and announces Macintosh. Apple has right to bundle WriteNow as possible advanced MacWrite.**
1985	**Apple decides it doesn't want WriteNow. Solaster continues to develop it as independent product.**
	Steve Jobs leaves Apple and founds NeXT.
	Jobs buys Solaster and hires programmers to finish WriteNow for Macintosh and NeXT.
1986	**NeXT sells marketing rights for Mac and PC versions to T/Maker.**
	T/Maker releases WriteNow 1.0 for Mac.
1988	**NeXTcube announced with WriteNow 1.0 bundled.**
	T/Maker releases WriteNow 2.0.
1989	**T/Maker acquires development rights to Mac version.**
	NeXT ships NeXTstep 2.0 with WriteNow 2.0 bundled.
1990	**T/Maker releases WriteNow 2.2.**
1991	**(October) WriteNow unbundled from NeXT system, shipped as shrink-wrapped product.**

Unbundling leaves WordPerfect in a 'wait and see' mode

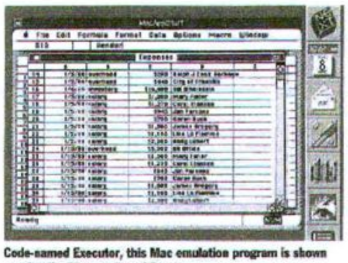
by SIMSON L. GARFINKEL

Orem, Utah – With the anticipated announcement of the unbundling of WriteNow, WordPerfect is likely to see a boost in sales beyond the 3200 copies the company said it has shipped to date. In the interim, the company is "in a wait and see mode" regarding NeXT development, said Tracy Powell, director of the NeXT software group.

[SEE WORDPERFECT, PAGE 4]

Macintosh emulation nears

by DAN LAVIN



Code-named Executor, this Mac emulation program is shown running the Mac version of Excel.

Albuquerque, NM – NeXT users may soon be able to run Mac software using a Mac emulation program – if its developer maintains its resolve to run the gauntlet of Apple's legal department.

NeXTWORLD obtained a copy of a Mac emulator, code-named Executor, developed by Abacus Research and Development (ARDI), which is based here. The program completely emulates a Macintosh window with pull-down menus, graphics, and mouse actions. Executor does not emulate the Macintosh Finder, however, so programs must be launched from a command line. Nor does Executor support System 7.0, color, or sound in its current version.

Clifford T. Matthews, ARDI president, said that Executor will be shown at UNIXopen in September and could ship in 1991, depending on legal and financing issues. Matthews claimed that the company followed stringent clean-room procedures in duplicating the functionality of the Mac ROMs without viewing or using any of Apple's code. "We've done things right, but we do anticipate legal action regarding look and feel," Matthews said.

Previously, efforts to clone the Macintosh have met with staunch legal challenges from Apple.

"If this could pass a legal challenge, which I doubt, there is no question that it would boost NeXT's position in the world," said Tim Bajarin, executive vice president of Creative Strategies of Mountain View, California.

There are thousands of programs on the [SEE EXECUTOR, PAGE 4]

NeXT takes low profile at Siggraph

by DAN GOLDMAN

Las Vegas – The thousands of programmers, engineers, and computer artists here recently for the annual Siggraph conference and exhibition had to look hard to find evidence of NeXT's participation in the high-end computer graphics markets.

NeXT cancelled its booth plans and instead hosted a hospitality suite at a conference hotel.

NeXT computers drew large and enthusiastic crowds in third-party booths on the exhibit floor, however. Brooktree and Philips-Signetics both highlighted NeXTdimension's video capabilities (each has chips on the ND board). Wolfram Research showed Mathematica 2.0 running on a NeXTstation Color. Midwest Litho Arts demonstrated the NeXTstation Color as a RenderMan rendering engine for a networked Macintosh running Pixar's Showplace 3D software.

NeXT developers in attendance included Andrew Stone of Stone Design, privately showing a new, more intuitive beta version of DataPhile, the flat-file database. NeXT itself showed a number of demonstration programs at the suite, ranging from a [SEE SIGGRAPH, PAGE 4]

Sun, SGI go downscale on workstations

by ELIOT BERGSON

Mountain View, CA – Two of NeXT's workstation competitors last month introduced lower-priced systems that may pose new challenges to NeXT's growing share of the professional workstation market.

Sun Microsystems introduced the monochrome SPARCstation ELC, a replacement for the company's SLC, starting at $4995 for a diskless model – the same list price as a base NeXTstation. An ELC with a 200MB hard disk costs $6295 – still within reach of potential first-time workstation buyers and those wanting to upgrade from PCs. Sun also announced a new midpriced color offering, the SPARCstation IPX, for $13,495.

Silicon Graphics (SGI) entered the fray with the color-based IRIS Indigo, priced at $7995, the same price as the NeXTstation Color machine. It offers 3-D graphics and digital audio tape (DAT)-quality sound [SEE WORKSTATION, PAGE 4]

NEWS ANALYSIS

Apple/IBM agreement puts NeXT in a quandary

Deal validates NeXT's approach to workstation market

by NICHOLAS BARAN

With the blockbuster technology-sharing agreement between Apple and IBM coming just months after the announcement of the ACE (Advanced Computing Environment) workstation standard, the future landscape of the workstation market is up for grabs, according to industry analysts. The announcements validate the course that NeXT has charted for professional workstations, but they also place NeXT's strategy at risk.

NeXT executives sought to put a positive spin on the developments, pointing out that NeXT already has an object-oriented development environment and a graphical user interface built on top of UNIX. "One of the things we like about the agreement is that it is a real endorsement of our strategy," said Mike Slade, NeXT's executive director of marketing. "They've (Apple and IBM) pre-announced by four years a system that we sell today. It's pretty gratifying."

Indeed, the time frame for the future Apple/IBM operating system is several years out, perhaps as long as five years, said Stewart Alsop, publisher of *P.C. Letter*. Nor is it definite that any product will result from the preliminary agreement. Several analysts compared the announcement to IBM's aborted plans to build systems around NeXTstep.

IBM licensed the NeXTstep environment in 1988 for a reported $10 million. After initial development on the RS/6000 and the PS/2, IBM abandoned the project. According to Dick Shaeffer, editor of *The Technologic Computer Letter*, "The parties in the Apple/IBM agreement should take note of what happened with NeXTstep. NeXTstep is a first-class technology, and IBM has done nothing with it."

At the least, Alsop observed, the agreement "clarifies and confirms IBM's lack of interest in NeXTstep."

The chips fly

While there are some positive aspects of the deal for NeXT, it raises a critical issue over microprocessor architectures. Future Apple workstations and file servers will be based on IBM's RS/6000 RISC (reduced instruction set computing) processor, not Motorola's 88000 RISC architecture, as had been widely anticipated. That lack of support may leave the 88000 dead in the water. Michael Slater, editor of Microprocessor Report newsletter, said the Apple/IBM deal "is not quite, but nearly, catastrophic for the 88000. It's questionable whether it's practical for Motorola to continue to invest in the architecture."

The 88000 has not fared well in the RISC processor arena, losing market share to Sun's SPARC and MIPS R3000 architectures. MIPS's successor chip, the R4000, has been selected by the ACE consortium, which includes Compaq, Microsoft, and Silicon Graphics, among others. Motorola's last hope for the 88000 was major support from Apple.

Shaeffer sees the agreement to let Motorola manufacture the RS/6000 for Apple and IBM as "a way for Motorola to save face" after losing support for the 88000; but in fact, said Shaeffer, the deal "shoves the 88000 into the embedded control market."

Giving Motorola the manufacturing rights for the RS/6000 single-chip implementation is a concession from Apple and a way to maintain its good relationship with Motorola. Apple needs Motorola for its current line of 68000-based computers, Shaeffer said.

Meanwhile, the change in Motorola's direction leaves NeXT in a quandary. It had been widely believed that NeXT planned to follow up its 68000-family computers with an 88000-based workstation. But that would leave NeXT as the only computer manufacturer supporting the chip.

"The 88000 is out of the mainstream. NeXT has enough problems; to come out with an 88000 machine would be bullheaded," said Slater. "To go through the pain of switching architectures and then use the 88000 would be a very foolish move."

New direction?

So how will NeXT react to the Apple/IBM alliance? NeXT isn't talking. "All I can tell you is that we have a really good relationship with Motorola," said Slade. "But our primary motivation is price/performance. At the moment, the 68040 is most important for us and has a lot of life left."

However, Shaeffer speculated that NeXT may take a new direction. "Jobs has a knack for headlines," he said. "I think he'll be the first one out with the Intel '586." The Intel chip is the next in line in the 80x86 architecture that has been the mainstay of IBM personal computers and clones. The 80586 is a big step up in power over the '486, however. It uses superscalar RISC technology to produce 100 mips (millions of instructions per second) of performance. Intel has said that the chip will be available in the second half of 1992.

That would be the right time frame for NeXT's next-generation systems. Other chip choices, including the Motorola RS/6000 and MIPS R4000, won't be available soon enough, according to Slater. "The '586 would be a reasonable choice and would give NeXT the ability to run software other than its own," he added.

Whether NeXT now turns to the Intel chip or seeks a different partnership, it is clear that the company has to re-evaluate its existing strategy. NeXT needs to go with a chip architecture that has broad support from other vendors. That's the only way to attract the software developers needed to make the NeXT platform successful.

The good news, analysts agree, is that NeXT has some time. Now that Apple, IBM and ACE have confirmed the wisdom of NeXT's basic approach, NeXT can convincingly argue that it is already delivering technology that the others have only promised. Then it can carefully choose a new chip architecture and still beat its competitors to market with advanced NeXT systems. ◆

Apple, IBM to share technology in 4 areas

The preliminary agreement between Apple and IBM is expected to be finalized this fall. Products resulting from this agreement should reach market in two to three years. The agreement listed four "areas of general understanding":

- **Integration of the Macintosh into IBM client/server environments, including joint development of a version of UNIX with a Macintosh interface.**
- **Future Mac workstations and file servers based on a single-chip implementation of the IBM RS/6000 RISC processor, which will be manufactured under license by Motorola.**
- **The establishment of hardware-independent software standards for multimedia.**
- **Development of an object-oriented operating system based on Apple's advanced "Pink" scalable operating system, now in the research and development stage.**

GARY SUEN

NICHOLAS BARAN *is formerly West Coast bureau chief for* BYTE *magazine. Baran is a NeXT user and coeditor of* Pen-Based Computing, The Journal of Stylus Systems *in Sandpoint, Idaho.*

WriteNow [CONTINUED FROM PAGE 1]

employee. He said that "substantial" funding for the new venture came from venture capitalists, although he declined to identify the source or amount of funding. NeXT has no equity involvement in the company, Adams said.

The other principals in the company, said to include several industry veterans, were not yet named at press time. The company will sublet office space from NeXT near its headquarters here.

Adams said that the other NeXT software involved in the deal will be announced and shipped in the first quarter of 1992. In addition, the company is looking to acquire or publish software produced by other NeXTstep developers, and it may develop its own software.

"NeXT didn't want to be in the software business, so we had been seeking a third party to pick up WriteNow," said Donna Simonides, NeXT's director of third-party relationships. "We could have gone to an existing company or encouraged a new one. We wanted someone who would be aggressive," she said.

"By getting out of the software business, NeXT will level the playing field for third parties. It is in the interests of customers to have competition," Adams said.

The chief beneficiary of the move will be WordPerfect Corporation, which faced a barrier in selling its NeXTstep word processor against a program that was free to all NeXT users (see related story, page 1).

"This puts us in a much stronger position," said Royce Bybee, product marketing manager at WordPerfect.

"The first thing [the new company] will have to do is to make WriteNow more of a full-featured word processor," Bybee predicted. "Comparing WordPerfect to WriteNow is like comparing a banana split to vanilla ice cream."

Adams said a price for the shrink-wrapped WriteNow had not yet been established, but that it would be set considerably lower than WordPerfect's $495. "There is a segment of the market that WordPerfect appeals to and a segment of the market that WriteNow appeals to," Adams said.

Other third-party developers reacted cautiously, unsure of how closely NeXT would be involved with the new company.

"If NeXT were spinning off a subsidiary that competed in major categories, it would create even less of an incentive for key third parties to support NeXT," said Jeff Anderholm, marketing manager at Lotus Development of Cambridge, Massachusetts.

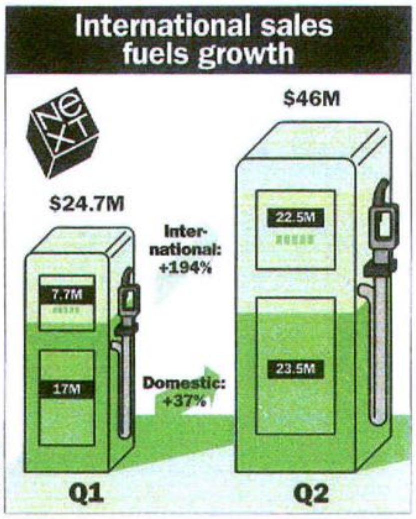
NeXT's Simonides denied that this was the case. "We have taken deliberate steps not to have a Claris situation. There is a complete separation of church and state. We are treating [the new company] like any other third party," she said.

Adams said that NeXT assisted the company in raising funds only by providing a reference. Raising venture capital "was a tough sell," he acknowledged, "but we have a good track record, and the venture capitalists recognized that NeXT is the most fertile ground for software now in the industry because it enables true creativity."

Royal Ferris, vice president of T/Maker of Mountain View, California, which markets WriteNow for the Mac, agreed: "When a hardware vendor aggressively supports [certain] application software, [other] third-party software publishers just shake their heads and think, 'Where's the opportunity for us?' "

"I think this is something that should have happened a long time ago. It surprised us that Steve [Jobs] didn't understand the mistake that Apple had made," by bundling MacWrite with the early Macintosh. ◆

Sales gain in Q2



GARY SUEN

by SIMSON L. GARFINKEL

Redwood City, CA – Fueled by the availability of color systems and strong international sales, NeXT's revenues grew to $46 million in the second quarter – an increase of 86 percent over the year's first-quarter sales.

Sales were boosted by shipments of the NeXTstation Color and NeXTdimension. NeXT also has started shipping a Kanji version of its operating system in Japan, which should further boost sales in that country.

Steve Jobs, president and CEO of NeXT, attributed the sales to NeXTstep, NeXT's object-oriented operating system. "Companies are buying NeXT computers because our object-oriented system software enables them to develop their mission-critical custom applications many times faster than on any other platform," said Jobs. "The investments we have made are beginning to pay off."

The investment is paying the biggest dividends overseas. According to NeXT, more than 49 percent of NeXT's total shipments went to customers in Europe and Asia. Seventy percent of NeXT's shipments in those markets.went to customers in business and government; the education market consumed the remaining 30 percent

Jobs said that the increased sales were an indication that computer users want the technology that NeXT is selling – and that major computer companies agreed, as evidenced by the recent technology-sharing agreement between IBM and Apple.

"We view the Apple/IBM announcement as a 100 percent endorsement of the strategy we embarked upon more than five years ago and are delivering today," said Jobs. "Our customers are choosing to get object-oriented system software now, rather than waiting for the rest of the industry to catch up in three to five years."

Even though NeXT is now shipping an advanced, object-oriented operating system, it's still a bit player among giants, said Peter Rogers, an analyst with Robertson, Stephens & Co. of San Francisco. "Those two vendors (IBM and Apple) have somewhere north of one-third of the market share in the worldwide PC business. NeXT has somewhere south of a third of a percentage point. They can afford to take a little longer."

But don't write NeXT off yet, he added: "I wouldn't be surprised if Steve keeps surprising us. It wouldn't be the first time that he's pulled a rabbit out of his hat." ◆

L.A. Sheriff, DARPA on NeXT list

by DARCY DINUCCI

Redwood City, CA – NeXT has made inroads in the government market with the announcement of major sales to the Los Angeles County Sheriff's Department and the Defense Advanced Research Projects Agency (DARPA).

The L.A. County Sheriff's Department has taken delivery of 130 NeXT computers and plans to purchase 200 to 300 more. The Sheriff's office has standardized on the NeXT for its Sheriff's Executive Support System, which will be used to integrate decision support and information gathering at the department's 100 sites. The new system will automate document management and other key areas with custom applications.

"In our view there was no close second to NeXT to do the kinds of things, right out of the box, that we need the system to do," said Rick Merrick, division chief of the Sheriff's Technical Services Division. The department's system will use software from Boss Logic, Frame Technology, Informix Software, and Oracle Corporation.

DARPA is adding NeXT to a research project designed to explore the ideal of the "paperless environment." The DARPA experiment also includes systems from other PC and workstation manufacturers. The inclusion of NeXT systems "demonstrates clearly that our products and technology are being accorded the same serious attention as that of other major computer manufacturers," said Fred Giodano, NeXT regional sales manager. ◆

NeXT shifts sales groups

by DAN RUBY

Redwood City, CA – NeXT's recent shuffle of its U.S. sales management and support organizations does not indicate a shift in strategy, said Erna Arneson, NeXT's new director of channel sales. Rather, the changes, which combined four channel groups into a single organization, eliminated four regional sales offices, and shifted some managers to new jobs in the field, were designed to improve efficiency and effectiveness, she said.

In the reorganization, the old groups that managed dealer sales, VAR sales, and higher education were merged into a single organization headed by Arneson. Two other groups were established to manage sales programs and to target strategic markets. The channel sales and sales program groups report directly to Todd Rulon-Miller, vice president of sales, while the strategic markets group reports to Mike Slade, executive director of marketing.

"Under this organization, we have better integration of the channels," Arneson said. "Each channel will offer the same programs, giving the company better consistency across the board.

"This also gives us a central focus for communication to the field [sales force], and it provides better synergy between sales and marketing," she said.

The strategy for signing up new dealers and VARs is unchanged, Arneson said. As of July, almost 50 VARs were selling NeXT hardware, and 30 dealer locations were in place. She said the company was on track to make its goals of 100 dealers and 100 VARs by the end of the year. ◆

NeXT Ink

by DAN LAVIN

Bumper crop in the Ukraine

NeXT-watching is like Kremlin-watching in the days before Glasnost. Since it's a private company, NeXT doesn't have to say anything about its finances. However, like the Kremlin, NeXT cannot be completely isolationist and also be a player on the world stage. So NeXT has begun the curious end-of-quarter ritual: It doesn't release all its numbers, just selected ones, leaving the rest of us to interpolate the whole picture from a few snippets. It's like May Day in Red Square, except Steve is still alive so there's no tomb for the executives to stand on.

NeXT released figures for the second quarter, that, on the surface, look excellent. They show a run rate commensurate with a $200 million dollar company and an 86 percent sales growth from the previous quarter. A closer look at the figures tell a slightly different story, however.

NeXT had a $46 million second quarter. The disclosed sales increase shows it did about $25 million in the first quarter. We were told that 8000 CPUs shipped in the first quarter. Given an average receipt to NeXT of about $5000 per machine (based on a reasonable estimate of NeXT's margins and the mix of machines sold), this is only 4400 new computers and about 3600 upgrade boards. Of these 4400 real computers, only about 3100 stayed in the United States. The rest went overseas. NeXT attributes some of this weakness to customers waiting for color machines. I'll give them that one.

The lesson here is that NeXT did not have a great first quarter, especially in the United States. If annualized , these first-quarter numbers showed a $100 million company with 20,000 units sold. Both these numbers are half what some analysts have said NeXT needs to maintain momentum.

Now on to the second quarter, the mother of all quarters. Yes, there was an impressive increase to a level that can sustain NeXT. But the important numbers are the units and the domestic/international breakdown. Assuming an average selling price of $6500 per system (higher this time because of color availability), sales were 7100 units. Only half stayed in the United States this time – 3550 units. This represents a 14 percent increase in units over a poor quarter, 37 percent by dollars.

Internationally, units almost tripled, while dollars more than tripled. These are great results. That's without the effect of having a Kanji operating system, since it began shipping in earnest only at the end of the second quarter.

So the question arises: What are they doing right over there? Or, what are they doing wrong over here? I'll suggest some possible solutions in a future column.

The danger in all of this is not that NeXT won't survive, but that the United States will be little more than a nuisance market. I predict at least a 60 percent share for international in the third quarter.

The domestic sales and marketing people are on the hot seat to make sure it doesn't hit 70 percent. We should know by NeXT May Day. If the news is good, NeXT will report units and dollars, domestic and international. If the news is bad, look for total transistors shipped. Or else a prediction of a bumper wheat crop in the Ukraine.

BRIEFS Continued

lines using ISDN, which is now being introduced by regional Bell operating companies throughout the country. Phone 404/840-9200.

Pixar, Steve Jobs's other brainchild, has signed on with Walt Disney Pictures to produce and distribute one or more full-length, computer-animated feature films. Pixar is best known for shorts like *Knickknack* and *Tin Toy*, which garnered the first Academy Award ever bestowed on an entirely computer-generated film. Given the normal production cycle in the movie industry, look for the first of the new offerings sometime in 1993.

Objective Technologies expects a fall ship date for OTProvide, the first third-party add-on to Lotus Development Corporation's Improv spreadsheet that utilizes Improv's Application Programming Interface Toolkit. OTProvide is an SQL generator and database link, browser, and retriever. It allows the end user to introduce data and information from Sybase databases into Improv spreadsheets through a point-and-click subsystem that searches databases and servers and mimics the NeXT File Viewer. Future releases will support any database that is supported by NeXT's upcoming DBKit, according to Sheridan Harrison, product manager.

Absoft has updated its FORTRAN 77 compiler for the NeXT to version 3.1 to be fully compatible with NeXT's 68040 machines. The company claims that the compiler produces code that executes up to two times faster than any other FORTRAN available for the NeXT.

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WordPerfect

[CONTINUED FROM PAGE 1]

The company recently scaled back its NeXT development staff from eight programmers to four, according to Tom Mallory, vice president of development. "It's dollars and cents. As the platform can support more programmers, we'll go ahead and put more programmers on it," he said.

Although a new major release of WordPerfect for the NeXT won't happen in the near future, the company plans several "interim releases," said Powell. First on the agenda is support for French and German. Another release will enable exporting of Microsoft Rich Text Format (RTF) files.

The next major release of WordPerfect for the NeXT will include many features now available only in WordPerfect 5.1. "We are going to have equation editing," said Powell, as well as the capability to undelete and create user-programmable macros. The next release may also include the capability to insert voice comments with NeXT's Lip Service.

Powell also raised the prospect of developing a new version of DrawPerfect for the NeXT platform. "We feel that we can make it the best draw package on any platform – but let's make some money before we start spending more," he said. ◆

Siggraph

[CONTINUED FROM PAGE 1]

possible Icon successor to a multimedia animation and authoring tool. There was no announced shipping date for this software.

Popular attractions on the exhibit floor included NewTek's Video Toaster and new 3-D design software from a number of companies, notably Alias. The scene stealer was Silicon Graphics's new IRIS Indigo computer (see related story, page 1), boasting a smart industrial design and SGI's suite of graphics software.

Other signs of NeXT could be found in software such as Hewlett-Packard's Interface Architect, a more limited and less elegant Interface Builder-like tool based on Motif.

Conference attendees were baffled by NeXT's pullout. "It has one of the best development environments," said one software engineer. "With that and its video, it could have blown people away." ◆

Executor

[CONTINUED FROM PAGE 1]

Macintosh, and only a hundred or so on the NeXT.

NeXTWORLD tested the pre-beta software successfully with several Macintosh applications, including Microsoft Excel and some public-domain programs. Although loading Mac software on the NeXT machine required running a series of installation programs from the UNIX command line, Matthews said that installation will be automated in the shipping version.

Matthews claimed that the shipping version of Executor will run software at Macintosh II speeds on a 68040 NeXT. ARDI expects to price Executor at about $700. Limited versions to run only one program, such as Excel, may be marketed for less than $100. ◆

Workstation

[CONTINUED FROM PAGE 1]

but is diskless and has no video-to-disk or compression capabilities.

"Anybody who delivers lots of price/performance at a midpriced level is inevitably a competitor of ours," said Mike Slade, NeXT's director of marketing.

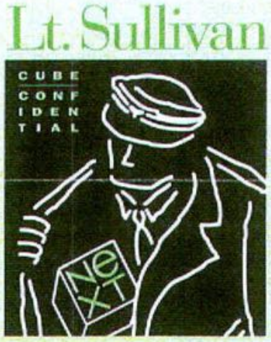
But the battle for professional users does not center only on price and performance, according to Lisa Thorell, a workstation-industry analyst with Dataquest of San Jose, California. "Sun is simplistic; it reacts to large market shares." The path of least resistance for them is to appeal to sophisticated PC users who want more power and strong software support, she said.

But that's not true interpersonal computing, allowing all workers in a group to contribute equally, according to Curtis Sasaki, NeXT's manager of hardware marketing "For Sun to sustain its growth, it decided to get into the professional workstation market. But you also have to have a great software base."

The IRIS Indigo machine challenges NeXT's attempt to take a share of the multimedia market, said Dataquest's Thorell. "SGI has lots of resources and has attracted lots of software. It is the Porsche of the workstation community. NeXT has to refine and narrow its marketing strategy to compete directly." ◆

Now, even Sullivan is plunging into color

Lt. Sullivan



Lt. Sullivan looked at his watch and muttered to himself about the receptionist, who was late for the third time this week. He hates to answer the department phones, although he always seems to get some interesting calls to put through when he does.

Lt. Sullivan looked at his watch as his stomach rumbled yet another time since he'd eaten the day-old pizza in the cafeteria. It crossed his mind that with the budget there they could afford decent food for the staff. "Time to get back to work," he thought as he turned back toward his computer screen. He figured he had about another hour before the boss would return from lunch and he would have to have something done.

Sullivan pulled out his notes to review the week's activity for his regular briefing to his boss.

Just when color laser printers are beginning to drop in price and become more common, NeXT is poised to release a very nice new printer product. The new color laser printer from NeXT, at 400 dpi, will again beat the 300-dpi limit of most of the competition. Also like the black-and-white NeXT laser printer, the NeXT color laser printer uses the NeXT computer to raster the image, which is then printed by a thermal dot transfer process engine. This printer is expected to debut for a list price less than $5000.

Is something going on in Redmond? If not, how come Steve has been spied in private chitchats with Chairman Bill on more than one recent occasion? We have already seen how new industry alliances can create strange bedfellows.

Speaking of which, most of the field operatives are expecting dire results from the blue and red alliance. The one thing on NeXT's side is that these guys are not going to get along. It should take their engineering staffs six months to figure out how to talk to each other; and then they need to agree on a language. I think the premarital agreement will collapse long before the two Johns arrive at the chapel.

I half expected Ron Howard to come running into the room and shout "Cut!" as I had my first experience with a rogue DGS3 board that a field agent managed to get her hands on for me. I was shocked when the agent opened the box, only because I had never seen a computer product ship with three external fans! This baby is one step shy of being a nuclear toaster, but I always wanted a combination workstation and tanning booth.

Originally known as the Daewoo Graphics Imaging System, this board was to be manufactured by Daewoo and marketed and distributed by Leading Edge. After two years of inactivity, the designers at the University of Washington granted a U.S. company nonexclusive rights to manufacture and distribute a version of the board worldwide. Cube Technologies' new version of the board will allow unmodified NeXT software to take advantage of up to 160 mflops. It is fast – incredibly fast. With a little ice and a beta copy of Photoshop NeXT, this could really ring the bells in the cathedrals of Cupertino and cause some sleepless nights down at Silicon Graphics.

Adamation has quietly dropped all immediate plans to develop a much-ballyhooed accounting package. Bottom Line was to be developed for the business market as the NeXT answer to this traditional DOS stronghold (and Macintosh weak area). How can one platform have the best spreadsheet and the worst accounting software (none at all)?

They are still having trouble with order management at NeXT, despite the numbers of units shipped so far. You would think they would have it down by now. Unfortunately, orders are still written down incorrectly, and the term "it's on the shipping dock" seems to mean "you're about four weeks away from your actual factory ship date." When it does ship, check your system carefully. More than one customer recently received mixed parity and nonparity memory chips.

Lt. Sullivan marveled at the consistency of the locations noted in his field agents' reports. Apparently, the best place to overhear everything you were never supposed to hear about the NeXT computer is the front lobby at 900 Chesapeake, Redwood City, California. You grab yourself a cup of coffee and sit in the big, uncomfortable black leather sofas, pretend you are reading the Wall Street Journal, and listen to the people chatting as they pass by. It is a terrible shame about the cancellation of the Odwalla juice concession, though.

I've still got some Steve-signed Sullivan shirts to pass along to tipsters. You can e-mail me at: Sullivan@nextworld.com or call my voice mail at 415/978-3189. Don't call at the Agency, though. If you do, you lose the shirt.

NeXTWORLD

EXTRA

NOVEMBER 1991

NEWS IN BRIEF

Computer Support Corporation unveiled a version of its popular Arts and Letters Graphics Composer for the NeXT platform. The program includes more than 5000 pieces of clip art and dozens of typefaces that users mix and match to create illustrations, diagrams, signs, and presentation aids. The program will ship in the fall of 1991. The company can be reached at 214/661-8960.

Stone Design shipped Create!, a professional color drawing application for the NeXT. It is used to create complex PostScript graphics and text. Create! was reviewed in beta by *NeXTWORLD* in the January/February 1991 issue and received 4 cubes as a beta rating. Create! costs $500. Stone Design: 505/345-5800.

Pantone colors will be available in future versions of the NeXT operating system, NeXT announced. Both the Pantone Matching System and the Pantone Process Color System will be included. The colors will all be available through the color list option in the Colors panel that spans all NeXT color applications.

NeXT CEO Steve Jobs became a father for the second time when his wife Laurene gave birth to Reed Paul Jobs on Sunday, September 23. "Laurene and I are wonderfully happy," he wrote in an e-mail message to employees.

Information Presentation Technologies (IPT) announced uSHARE 2.05 for the NeXT. The software allows a NeXT workstation to serve as an AppleShare file, print, and e-mail server. While operating as a server, the NeXT can still be used as a fully functional workstation. An optional bidirectional [SEE BRIEFS, PAGE 5]

NeXTWORLD Expo coming in January

See Page 3 for details

Graphics apps take off

San Jose – NeXT's potential as a publishing platform received a boost last month as third-party developers announced new programs for page layout, presentation, illustration, and scanning at the Seybold Computer Publishing Conference.

Concurrence: New presentation outliner from Lighthouse Design

by DAN RUBY

Building on the success of its business graphics package, Diagram!, Lighthouse Design introduced Concurrence, an integrated outliner and presentation program.

Concurrence follows the model of Macintosh presentation programs such as Aldus Persuasion and Symantec's MORE by combining an outline program with graphics tools to produce a series of slides that can be output to a variety of devices.

With the inherent advantages of NeXTstep, however, building professional-quality presentations with Concurrence is much easier than with other tools, according to Jonathan Schwartz, manager of sales and marketing for Lighthouse Design.

"Our goal was to make a tool that would enable people to build a presentation in less than an hour," Schwartz said.

To begin a presentation, users construct an outline with multiple levels of headlines that can be moved, cloned, and displayed in collapsed or expanded formats. Text formatting of any headline is automatically reflected in other headlines of the same hierarchy.

Unlike other outline programs, sections of the [SEE LIGHTHOUSE, PAGE 5]

PasteUp: Right-Brain targets page-layout gap

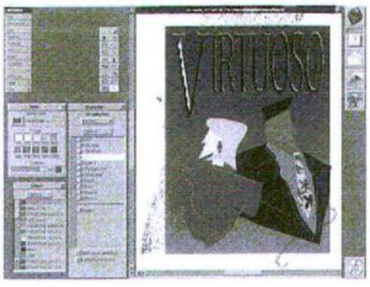
by DARCY DINUCCI

Promising to fill the void for NeXT page-layout applications, Right Brain Software last month demonstrated a pre-alpha version of PasteUp.

Although the version of PasteUp shown had very few features complete, its basic approach, emphasizing point-and-drag interaction with on-screen objects, was evident. For example, Right Brain founder Glenn Reid demonstrated the program's ability to move graphics from page to page by simply dragging them in [SEE RIGHTBRAIN, PAGE 5]

Virtuoso: Illustrator challenger

by DARCY DINUCCI



Unlike FreeHand on the Mac, Altsys's Virtuoso illustration program shows PostScript fills on-screen.

Altsys Corporation, developer of Aldus's FreeHand for the Mac, took its battle with Adobe Systems for the illustration market into a new arena last month when it announced Virtuoso for the NeXT.

Like FreeHand, Virtuoso features multiple "layers" for adding and subtracting graphic effects from a document. Altsys claims that Virtuoso will be able to handle an unlimited number of layers and an unlimited number of levels of undo/redo. Advantages over the Mac product include the ability to view PostScript effects on screen, thanks to the NeXT's Display PostScript interface, and the ability to edit text within the graphic display instead of in a special text window.

The company said that the program would be priced at $695 and would ship in the first quarter of 1992.

Comparing Virtuoso to Adobe's Illustrator for the NeXT, Altsys product manager Kevin Crowder said, "We think we're more like a native NeXT application than a port from the Mac, and we have a tremendous [SEE VIRTUOSO, PAGE 6]

NeXTstep 3.0 on the horizon

by SIMSON L. GARFINKEL

Redwood City, CA — NeXT is on target for a mid-1992 release of NeXTstep 3.0, which will provide major new communications, database, and programming functions without significantly modifying the current system, according to developers familiar with the project.

In addition to the previously disclosed client support for Novell and AppleTalk networks, and a new database development system, sources said that the new system may include:

- full support for high-density Macintosh floppy disks
- a higher degree of control over the NeXT's floppy disk and communications ports
- support for PostScript Level 2, including Pantone color matching
- a sound server, which will automatically mix sounds played by multiple applications at the same time
- synchronized sound and video
- 3-D PostScript extensions
- support for screens with different pixel configuration than the standard NeXT MegaPixel Display. [SEE NEXTSTEP 3.0, PAGE 5]

Appsoft ships WriteNow, announces Pixelist

by DAN RUBY

Palo Alto, CA — Appsoft kicked off ambitious plans to become the premier publisher of NeXT software last month by shipping a shrinkwrapped version of WriteNow and announcing plans to publish Pixelist, a photo-editing program.

After completing a complex negotiation to acquire rights to WriteNow from NeXT and closing a venture-capital deal with The LEK Partnership in September, Appsoft began selling its packaged version of the formerly bundled word processor on October 15. Priced at $199, the program comes with a disk of three Adobe fonts and an sampler of EPS images from T-Maker Co.

According to Appsoft President Randy Adams, an upgrade to WriteNow is under development for release in the second quarter of 1992. The new [SEE APPSOFT, PAGE 6]

Appsoft
WriteNow

WriteNow is now shrinkwrapped by Appsoft.

NEWS ANALYSIS

Apple aims '040 Quadras at NeXT market territory

Appealing price, performance, and features – for a Mac

by BRUCE F. WEBSTER

With the introduction of its 68040-based Macintosh Quadra on October 21, Apple has taken its first step into NeXT's market niche for professional workstations. But while the new system will provide a performance boost for Mac users, its comparative features and pricing do not measure up to NeXT's current products.

For all its advantages, the Macintosh lived most of its product life under the stigma that it was underpowered and overpriced. Then, just as the Mac was gaining respect vis-à-vis PCs, low-cost workstations from Sun and NeXT once again made Macintosh price/performance look bad – especially since Apple's best-selling system, the Mac Classic, has roughly the same computing power as the original Macintosh system introduced back in 1984.

With the Quadra series, Apple is seeking to regain its position. The first two Quadra models are the Quadra 700 desktop system, built roughly like a Mac IIci, and the Quadra 900 tower. Both have the same basic hardware configuration: a 25MHz 68040 CPU, on-board Ethernet and color video, improved sound functionality, and other performance enhancements. All of this is offered at what are – for Apple, at least – quite competitive prices.

With the Mac Quadras, Apple now has a legitimate entry into the workstation market. Given the broad acceptance of the Macintosh and the vast body of Mac applications, this should give Sun, HP, DEC, and NeXT a bit more to worry about. On the other hand, Apple's new products may actually give NeXT a boost: Apple's system uses the same processor as the NeXTstation, but at a substantially higher cost. The table here compares some equivalent (or near-equivalent) Quadra and NeXT configurations. As you can see, once you start putting together complete systems, the prices for the Quadra systems start going up significantly. The table prices assume third-party memory and storage devices.

Second effort

The Macintosh IIfx was supposed to lead Apple into the workstation market when it was introduced a year and a half ago, but three major problems caused the attempt to fall short. First, the performance boost of the IIfx – about double the speed of the Mac IIci – was significant, but it wasn't enough to catch the market's attention. Then, the machine's non-standard architecture – with latched RAM requiring custom SIMMs, direct memory access for the SCSI port that never worked, and a couple of I/O processors that didn't do much – stymied developers. Third, the price – $10,000 to $12,000 at introduction for a base system with no monitor, video card, or keyboard – was out of range. The Mac IIfx made even the original $10,000 NeXTcube look like a great deal.

PERSONAL COLOR SYSTEM

	Color NeXTstation	Price	Quadra 700	Price
CPU	25 MHz 68040	$6650	25 MHz 68040	$6999
Memory	12 MB RAM		12 MB RAM	$240
Storage	200 MB hard drive, 2.88 MB floppy drive		160 MB hard drive, 1.44 MB floppy drive	
Sound	25 MHz 56001 DSP, microphone jack, DSP port, headphone jack, dual line-outs NeXT Sound Box (video, audio, microphone)	$125	Apple sound chip, microphone jack, hand-held microphone, headphone jack	
Networking	Built-in twisted-pair, thin Ethernet (AppleTalk to come in NeXTstep 3.0)		Built-in Ethernet, AppleTalk Thin-wire transceiver	$175
Input	NeXT keyboard, two-button mouse (in Starting Kit)	$225	One-button mouse Apple keyboard	$129
Video	Color; 1120 x 832, 16 bits/pixel		Color; 1152 x 870, 8 bits/pixel	
Display	17" Color Megapixel Display; color, 1120 x 832, 16 bits/pixel	$1995	Apple 13" RGB Display; color, 640 x 480, 24 bits/pixel Extra 1.5 MB VRAM	$999 $597
Total		$8995		$9139

This time, Apple appears to be a bit closer to the mark. According to Apple, a Quadra system is roughly four times faster than a Mac IIci, and double the speed of a IIfx. This means that it should be comparable to NeXTstation performance in many areas and superior in some. There are no fancy tricks in the design, but tweaks have been made in all the right places. You can even use regular 80-nanosecond DRAM SIMMs. And list prices start at $5699 for a bare bones Quadra 700 (4MB RAM, floppy drive) and $7199 for a similar Quadra 900 tower.

The Quadra's performance increase comes from several factors:

- a 25MHz 68040 CPU
- division of the internal architecture into two buses, a 25MHz system bus and a 16MHz I/O bus
- a faster SCSI controller chip, located on the system bus rather than the slower I/O bus
- significant improvements in NuBus performance, including placing the NuBus controller on the system bus and support of pending writes, block transfers between main memory and NuBus cards, and double-speed burst transfers between NuBus cards
- separate VRAM for the on-board video.

What is most significant about this architecture is its cleanliness and simplicity. Almost every Mac since the IIci has had some tricky architecture, and in almost every case, that has come back to haunt Apple, usually through performance or compatibility problems.

Feature for feature

The Quadra series's hardware integration is another step forward for the Macintosh, but still doesn't measure up to NeXT's. The built-in color video uses VRAM banks expandable to 2MB, enabling the Quadra systems to support 24-bit color on 13-inch monitors and 8-bit color on Apple's newest 21-inch monitor. Apple claims drawing performance is 80 percent of its 8•24/GS accelerated graphics card, due to direct access by the CPU to the VRAM, which is connected to the system bus. This gives the Quadra series graphics performance that is probably better than the NeXTstation Color, but not up to NeXTdimension standards.

FILE SERVER

	NeXTcube	Price	Quadra 900	Price
CPU	25 MHz 68040	$6775	25 MHz 68040	$8499
Memory	16 MB RAM	$250	16 MB RAM	$375
Storage	105 MB internal hard drive 2.88 MB floppy drive, 1.2 GB external hard drive	$2200	160 MB internal hard drive, 1.44 MB floppy drive 1.2 GB external hard drive	$2200
Sound	25 MHz 56001 DSP microphone jack, DSP port, headphone jack, dual line-outs		Apple sound chip, microphone jack, hand-held microphone, headphone jack	
Networking	Built-in twisted pair, thin Ethernet (AppleTalk in NeXTstep 3.0)		Built-in Ethernet, AppleTalk Thin-wire transceiver	$175
Input	NeXT keyboard, two-button mouse (in Starting Kit)	$225	One-button mouse Apple keyboard	$129
Video	Mono; 1120 x 832, 4 bits/pixel		Color; 1152 x 870, 8 bits/pixel	
Display	17" Megapixel Display, mono: 1120 x 832, 4 bits/pixel	$995	15" Apple Portrait Display, mono: 640 x 870, 8 bits/pixel	$1099
Total		$10,445		$12,477

The Quadra series also comes with built-in Ethernet – sort of. The basic hardware is on the motherboard, but you still need to buy a transceiver – an Ethernet adapter, if you will – to connect Apple's 15-pin output to any standard Ethernet cabling (twisted-pair, thin, or thick).

The Quadra 700 can hold two 3.5-inch, one-third–height mass storage devices, typically a floppy drive and a hard disk. The Quadra 900 has lots of internal room; it will accommodate four 5.25-inch, half-height devices, two of which can have removable media (floppy drive, optical drive, CD-ROM). It's obvious which one is intended to be a network server.

Sound on the Quadra series has been enhanced a bit, though it falls short of the NeXT's built-in digital signal processor. It's based on an Apple sound chip, which can produce stereo output, but don't let the dual line-ins on the Quadra 900 fool you: the sound system can only digitize in monaural. The Quadra 900 has a nice touch, though: an internal connector allowing you to run stereo sound directly from a CD-ROM player to the stereo headphone output.

The area in which the Mac continues to best the NeXT is expandability. The NeXTstation has no slots for add-on boards, and the NeXTcube's slots have such a large (11-inch x 11-inch) form factor that few firms are designing cards for them. The Quadra 700 has two NuBus slots and a single processor direct slot, or PDS (although if you use the PDS, you can't use one of the NuBus slots, due to overlapping alignment). The Quadra 900 has five NuBus slots and an overlapping PDS.

Winners and losers

As is often the case when Apple introduces new machines, its biggest competitor will be itself. While Apple would make no comments on future pricing plans for either the Macintosh IIci or IIfx, it stands to reason that these systems will either be phased out or reduced in price. Dropping the price on the Mac IIci could put additional price pressure on the Mac IIsi, which is overpriced and underpowered anyway.

Even with all the things Apple did right, the Quadra series falls short of being a breakthrough; it's a step up, but not a quantum leap in architecture, function, or price/performance. With all that, however, Apple will probably sell a lot of Quadras – especially the Quadra 700 and the upgrade board. And all of its workstation competitors are vulnerable: Sun, HP and DEC because of their weak interfaces and expensive software; NeXT, because of its ongoing fight to gain credibility and market share.

By shipping a system with the same processor as the NeXTstation, Apple validates the processor while underscoring the relatively low cost of equivalent NeXT systems. At the same time, Apple's partial movement into architecture that is standard on the NeXT emphasizes the importance of those features without challenging NeXT's leadership in them. Maybe Apple is saving its best stuff for the next generation of Apple computers, RISC-based systems running the "Pink" operating system. As Philippe Kahn, president and CEO of Borland International, a Scotts Valley, California, software company, reportedly said, the Macintosh III already exists: you just have to go to Redwood City to get one.

BRUCE F. WEBSTER *is a contributing editor to* NeXTWORLD.

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NeXTWORLD Expo set for January in SF

by DAN LAVIN

San Francisco — *NeXTWORLD* magazine announced plans for the first-ever gathering of the entire NeXT community at *NeXTWORLD* Expo '92. The event is set for the Civic Auditorium in San Francisco, from January 22 to 24.

"The whole NeXT phenomenon is in the process of exploding, while at the same time there is still the feeling of a tight-knit family," said Jeannine Barnard, associate publisher of NeXTWORLD. "There has never been a formal gathering of this community before, and we're thrilled to host this celebration and provide an opportunity for the world to see all facets of the NeXT in one place at one time," she said.

The Expo will have a comprehensive program of activities for NeXT users and developers, including these events:

- a trade show, featuring hardware and software products available for the NeXT platform
- keynote addresses from leaders of the industry, including NeXT CEO Steve Jobs
- a user conference track organized by the editorial staff of *NeXTWORLD* magazine
- a NeXT Developer Conference organized by NeXT's Developer Group
- a meeting of the International User Group, bringing together members from the over 200 NeXT user groups around the world.

The product exhibition and user conference will run for two days, with the developer conference following on the third day. Further details will be announced soon in *NeXTWORLD*.

Expo at a glance

What *NeXTWORLD* Expo
When January 22–24, 1992
Where San Francisco Civic Auditorium
Registration information To come in *NeXTWORLD*

European Expo shows French products

by JAMES FELICI

Paris — The first European NeXT exposition, a three-day show called "NeXT is Now," held at the Centre National des Industries et Techniques here in September, drew a strong turnout of locally developed applications. NeXT attendees, however, were vastly outnumbered by visitors to AppleExpo, which ran concurrently in the same building.

Among the homegrown products from French developers:

A trio of NeXTstep applications from Teledia S.A., a Lille-based company founded by three former Carnegie-Mellon students. PhrasePlayer works as a dictaphone for LipService memos. Using pauses in the sound file as clues to structure, the program can back up and repeat a sentence or jump ahead a sentence at a time. The typist can also stop and start the voice memo at any time by giving a voice command.

The second program, FileMaster, is a simple flat-file database suitable for list management and scheduling. Each cell can have a unique set of attributes and a different structure. A forthcoming report generator will enable users to superimpose a data report on any TIFF, PostScript, or fax image, as well as other formats.

The company also showed BackupMaster, a hard disk backup program of a type familiar to PC or Mac users.

An employee of NeXT Europe demonstrates software at NeXT is Now.

The Ariel music synthesis system for real-time signal processing, developed by researchers at the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris. The Ariel board piggybacks on a NeXTcube, using its host for graphic interface and file storage. The computing is done on the Ariel board, which sports two Intel i860 processors and a 56000 I/O chip. The board's designer, American Eric Lindemann, claims processing speed "maybe a quarter as fast as a Cray."

Ariel's MAX software is a graphical sound programming language developed at IRCAM that is used to create and edit sounds. Another program, ANIMAL, enables the user to create interfaces to control sounds and the relationships between them.

Priced at $14,995 in a single-board configuration, the product will probably be used in recording studios. The Ariel system is marketed in the U.S. by Ariel Corporation of Highland Park, New Jersey.

Cub'X-Window, from Cub'X Systems, enables a NeXT machine to run on a Sun workstation network as an equal partner. Running Cub'X-Window without starting NeXTstep makes the NeXT look and act just alike a Sun workstation, with performance equivalent to a SPARCstation I+.

Other booths featured custom Sybase applications, imported software (WordPerfect, Sybase, Improv, and Illustrator), bundled systems built by local NeXT Centers, and basic NeXT technologies (sound management, multimedia, color graphics, and voice mail). The busiest booth was the one demonstrating Interface Builder.

Users unite at D.C. Super Seminar

by STUART SILVERSTONE

McLean, VA – A community that had only existed in the tenuous realm of telephone and e-mail was brought to life at the Super Seminar here on September 28 and 29. The Washington NeXT User Group (WaNUG) event drew 300 attendees from 35 user groups, many states, and several foreign countries. Thirty vendors took the opportunity to show off their wares.

"It was an opportunity for those who had only known each other by e-mail to see faces and shake hands," said Conrad Geiger, international NeXT user group manager.

Attendees at the weekend meeting, held at a Mitre Corporation facility here, launched two new international groups, one for users and another for product developers. User applications were a strong theme of the conference, especially those advances on the leading edge of science, sound, and visualization.

The influence of the federal government was never farther from the conference than the sign (unused at this event) in the front of the room that could be lit unclassified, confidential, secret, or top secret as needed. Vendors voiced pleasure with the purchasing responsibility of attendees and especially the timing of the conference at the end of the government's fiscal year, when federal users are eager to spend remaining budgeted funds.

"This is a good market, because the government buys a copy for every machine [for which they need it]," said Andrew Stone, president of Stone Design, a NeXT software developer from Albuquerque, New Mexico. "Also, this show disposed of the myth that there's not much software for the NeXT."

In the keynote address, Los Alamos National Laboratory researcher and MediaView software developer Richard Phillips challenged users to make their multimedia requirements known and not passively allow vendors to define the industry. He also demonstrated MediaView's ability, following the capabilities of word processing programs, to easily integrate interactive scientific visualizations into a document.

On another panel, Henning Leidecker, an engineer at the NASA Goddard Space Flight Center, described how the platform aids the analysis of data used in the launch and support of the Geostationary Operational Environmental Satellite (GOES) – the results of which are seen daily on most local television weather newscasts.

Software multiplies scanner options

by DARCY DINUCCI

San Jose — Second Glance last month announced a universal scanner application designed to provide drivers that allow almost any scanner to be controlled by a NeXT workstation. Called ScanTastic, the Second Glance product is accessible through the NeXT Services menu, which is included in any well-behaved NeXT 2.0 application.

Although any scanner with the requisite interface (the NeXT supports SCSI, and with adapters, GPIB, or general purpose interface bus) can theoretically be connected to a NeXT machine, NeXT-specific software is required to control the hardware from the workstation. ScanTastic provides a scanner control interface that can be used with multiple brands of scanners. Second Glance currently offers drivers for the Epson ES-300C (GT6000) and the Nikon LS-3510 slide scanner. Other drivers are slated for release in the near future.

ScanTastic also includes color-correction features such as brightness, contrast, saturation, and tone curves. The program's editing features are provided in a script-like interface that allows users to apply image-editing commands to the image without changing the underlying file until the image is saved. The program will also accept external modules for additional capabilities.

The program will ship this month at a price of $595 for the Epson version and $995 for the Nikon version. Additional drivers after the first will be offered at substantial discounts.

ScanTastic is the first NeXT product from Second Glance, which has created a custom version of ScanTastic and other graphics programs for the Macintosh. Second Glance is located at 25381-G Alicia Pkwy. #357, Laguna Hills, CA 92653. 714/855-2331; fax 714/586-0930.

BUSINESS NEWS

Analysts split on Apple/IBM

by DAN LAVIN

San Francisco — The announcement last month of a joint venture between Apple and IBM to develop an object-oriented operating system for future workstations appears to erase any possibility that IBM will release a product based on its earlier license of NeXT's system software, according to analysts.

NeXT claimed that the formation of Taligent validated its own technology and approach to the market. "In four to five years, they may have something as good as NeXT has today," said NeXT CEO Steve Jobs.

The Taligent offering is not expected to be ready until 1995 or later, but IBM and Apple also announced a short-term solution based on a RISC chip called PowerPC that is coupled with a PowerOpen operating system comprising OSF1/AIX UNIX and the Macintosh user interface.

Some observers viewed the PowerOpen announcement as a threat to NeXT in the near future. They "are in big trouble," according to David Card, Director of Systems Research for International Data Corporation, an industry research firm.

Other analysts noted, however, that computer industry alliances sometimes fail to bear fruit. The conflicting corporate cultures and business goals of the two industry giants leave some doubt as to their ability to produce joint products.

"It is easier to make alliances than innovative products," Jobs said.

The PowerOpen and Taligent initiatives appear to directly overlap with NeXT's strategy. Indeed, IBM vice president Jim Cannavino and Apple CEO John Sculley used phrases such as "personal workstation," "custom applications," "object-ori-

[SEE APPLE/IBM, PAGE 6]

HSD takes over Abaton fax modem

by DAN LAVIN

Mountain View, CA — HSD Microcomputer U.S. continued its expansion in the NeXT marketplace last month with the acquisition of Abaton's InterFax 24/96. The Mountain View–based company will repackage Abaton's existing inventory and OEM future product directly from Abaton's parent company, Everex, as part of a long-term relationship.

"The main reason [for the deal] is that with NeXT changing their platforms we'd have to invest considerable resources to update our product," said Mark Marlow, director of mar-

[SEE HSD, PAGE 6]

NeXT on MTV: The commercial

The NeXT computer was the star of a recently produced television commercial for TDK audio tapes, to be aired nationally on network television and MTV.

The commercial, which shows a writer working on an article for Audio magazine, was originally to have featured a typewriter, but the commercial's producers, Partners USA, and ad agency, Lord, Dentsu & Partners, decided that that wouldn't be in keeping with TDK's high-tech image. Partners' research team, headed by Greg Ramsey, was swayed by a NeXT brochure that not only covered the machine's features but showed how well it photographed.

Although the NeXT was chosen, like many television personalities, for its good looks, the producers soon discovered that this star had some soul. In the spot, MediaStation was used to add special effects from video sequences, and the writer can be seen using WriteNow. Ramsey cited Display PostScript's type-scaling features as an important benefit in a commercial in which typing plays an important role. — *Lee Sherman*

NeXT hones focus on custom development

Ads, seminars to promote development tools over productivity

by DAN RUBY

Redwood City, CA – After a thorough review of its marketing strategy, NeXT has begun rolling out a major new campaign of advertisements and seminars focusing on the advantages of NeXT computers for custom application development.

"We have spent six months listening to our customers to better learn who they are and, just as important, who they are not," said Ronald Weissman, director of strategic marketing. "What we have found is that our strength is in custom development of mission-critical applications, where new technology makes the difference in functionality, time to market, and maintainability.

"We have to focus on what we do uniquely well versus what we do somewhat better. For now, custom development is our most compelling sale," he said.

"What they are saying is that they want to compete against Sun and not against the Macintosh," said Andrew Stone, president of Stone Design, author of Create! and Dataphile. "I'd rather see them spending tons of marketing bucks to target Joe user."

Weissman said that the new focus goes hand in hand with earlier marketing approaches focused on interpersonal computing, publishing, and general productivity. "This is a matter of broadening our strategy, not throwing anything away. Typically, after customers have developed their apps, they use it for many other purposes."

He described the typical application for custom development as containing several key attributes, including a back-end database, multimedia data types, and networked workstations. Many of NeXT's key installations, including Wall Street firms, medical institutions, the William Morris talent agency, the L.A. County Sheriff's department, and the Alain Pinel real-estate firm, fit this description, he said.

"These companies live and die by the speed at which they can get a custom app to market. With mission-critical applications, it is a question of whether it makes money for you," Weissman said.

Weissman also said that today most companies buy dedicated machines – usually workstations – for custom development and personal computers for general productivity. NeXT will position its computers as fulfilling both requirements in one machine.

Weissman would not say how much money NeXT has earmarked for the campaign, but called it "a significant investment over the course of the next year." He said that the market for custom programming services for Fortune 500 companies and federal agencies was more than $1 billion last year.

Canon USA becomes VAR

by DAN LAVIN

San Jose — Canon USA's extensive copier dealer network has begun selling NeXT machines bundled with Canon Color Laser Copier products. A value-added-reseller agreement with NeXT puts Canon in a "position to create complete color solutions," said Hideharu Takemoto, CEO of Canon USA.

When attached to a NeXT computer with controller software, the color copiers become both high-end scanners and color printers. A complete solution also requires the purchase of a PostScript RIP (Raster Image Processor) as a front-end for the copier. The NeXT performs processing of black-and-white images internally, allowing for considerably less expensive "dumb printers." According to Rob Poor, the NeXT developer advocate responsible for the Canon relationship, there are technical reasons why the operating system cannot yet perform similar internal processing for the Canon printers.

The cost of the total package, including the PostScript RIP, will range from $47,500 for a system that includes a CLC300, to $71,995 for a CLC500 system. Canon will also release a new Color BubbleJet Copier A1 configuration in the near future.

Canon introduced its line of color copiers in 1987 and dominates this market and has the largest U.S. market share of the entire copier market. The NeXT/Canon bundles will be marketed to service bureaus and large in-house corporate printing operations.

The deal may be the first step in a deeper relationship between NeXT and Canon involving color printers. At a press conference here, Steve Jobs said that "we believe color printing will be very important in the near future." Discussing the need for low-cost color printers, Jobs said, "you'll be seeing some very exciting technology with Canon next year."

Sales Watch

As NeXT continues to gain market share, we'll keep track of some of the larger purchases.

Customer	Application	# of Units	Major Software
Osaka University Osaka, Japan National university	Teaching tool for science and computer science curriculum and courseware development	400	Interface Builder, Diagram!, Improv, SAS, Mathematica
First National Bank of Chicago Chicago and London Banking and securities trading	Capital markets applications to support trading and risk-management business	80 (Aug.) 50 (Oct.)	Improv, Mathematica, Word Perfect
Pinole Point Steel Richmond, California Steel manufacturing	Materials Requirement Planning, financial analysis, inventory tracking	40 (Oct.) 60 (Jan., 1992)	Custom software from Bayard Open Systems and Oracle

Lighthouse

(CONTINUED FROM PAGE 1)

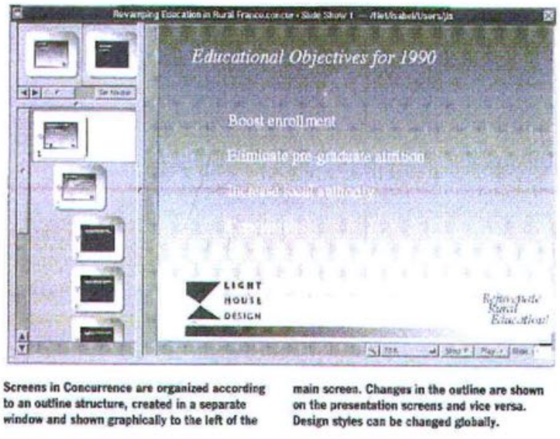
outline are fully visible as they are moved from place to place. Multiple views of the same outlines can be constructed for different audiences and managed from a view browser.

When displayed in slide view, each major headline and its sublines appears as a separate page. A slide-sorting feature allows users to select individual slides for further editing or for changing the order of slides. Users can design one or more master slides using a palette of design tools and by dragging in any EPS or TIFF image that will appear on each individual slide.

The slides can be output to a printer, 35mm slide recorder, or to the screen. For on-screen slide shows, the program can be set to take over the full screen, and a variety of transitions are available for special effects between slides. Voice annotations can be attached to play during a slide show.

Lighthouse said it anticipates users will want to send presentations via NeXTmail, so a "prepare for mailing" feature packages related documents into an e-mail message.

Concurrence is slated to ship in December. Pricing has not been set. Lighthouse Design is located at 6516 Western Ave., Chevy Chase, MD 20815; 301/907-4621. ◆


Revamping Education in Rural France.concur - Slide Show 1 — /Net/isabel/Users/js
Educational Objectives for 1990
Boost enrollment
Eliminate pre-graduate attrition
LIGHT HOUSE DESIGN
Rejuvenate Rural Education!

Screens in Concurrence are organized according to an outline structure, created in a separate window and shown graphically to the left of the main screen. Changes in the outline are shown on the presentation screens and vice versa. Design styles can be changed globally.

NeXTstep 3.0

(CONTINUED FROM PAGE 1)

- a significantly faster implementation of the NXBitmapRep class, which will effectively allow programs such as SoftPC and co-Xist to directly access the screen for dramatically increased performance
- an integrated help system.

Unlike the transition from NeXTstep 1.0 to 2.0, sources say that version 3.0 will not constitute a major operating system overhaul. Many of the features being added to the system are primarily in response to requests from third-party developers who had problems with the 1.0 and 2.0 system software.

Other features that were only partially implemented but disabled in NeXTstep 2.0 – such as support for multiprocessor systems – will be operational in 3.0.

Other new features are provided for programmers, including:

- NeXT's proprietary B-Tree package and an application programmer's interface to allow programmers to access the words and definitions inside the NeXT's on-line Webster's dictionary
- added support for internationalization of applications
- modifications to Interface Builder so that custom objects can have their own custom connections inspector.

According to a member of the development team who spoke at a recent Bay Area NeXT User Group developer meeting, Version 3.0 will retain the version 2.0 Text Object, the NeXT's mini-text editor used by most application programs that allows text-field input. The Text Object will be rewritten for Version 4.0, he said.

Sources said NeXTstep 3.0 will run on the base NeXT configuration: a monochrome NeXTstation with 8MB of RAM and a 105MB hard disk. The operating system will work with both 68030- and 68040-based workstations. NeXTstep 2.0 application programs should run under 3.0 without modification or needing to be recompiled, but NeXTstep 1.0 application programs will probably not work without changes. ◆

RightBrain

(CONTINUED FROM PAGE 1)

a reduced view and to rotate a graphic by dragging its corner.

Reid said he was not trying to break any new ground with the feature set of his program, but to do "ten to twenty percent better than anything you've seen before doing the same old stuff." He said that the program would be available in the first quarter of 1992. No price has been set.

In introducing Reid, NeXT CEO Steve Jobs said that four page-layout programs were under development for the NeXT. Currently, the only layout program available is FrameMaker, which is best suited to highly formatted documents. Pages Corporation of San Diego showed an early version of its program earlier in the year and hopes to ship in mid-1992. Jobs declined to name the other two, but said that one should be announced early next year and the other later in 1992.

PasteUp's approach to document creation spans the middle ground between the structured document and pasteboard approaches that have traditionally defined page-layout programs. Reid described the method as "experimenting until you find what you like." Columns are defined loosely at first, by dragging a column-creation tool, but once the designer is satisfied with the look, the program can regularize the grid. According to Reid, elements can be defined either as a master page or as a stand-alone design.

The program uses a variety of floating tools, including a palette that displays the user's selection of EPS and TIFF images, which will probably ship with the program as separate utilities. Reid also plans free-floating rulers, which can be dragged to any point on-screen, shortened or lengthened by dragging, be joined to form a T-square, or switched into a centering mode that stretches the ruler at both ends when one end is dragged.

The program shares some characteristics with TouchType, which was developed by Reid for Right Brain but was later sold to Adobe Systems. Right Brain also ships LockScreen, a screen saver utility for the NeXT. The company is located at 132 Hamilton Ave., Palo Alto, CA 94301. 415/326-2974; fax 415/326-2977. ◆

BRIEFS Continued

spooler allows a variety of PostScript output devices to be connected either to the Macintosh network or to the NeXT network, with all users having access to all printing resources. The software is fully compatible with the Apple Filing Protocol. uShare 2.05 costs $1195 per desktop, the Print Spooler an additional $495. IPT: 805/541-3000.

Top Draw 2.0 was scheduled to ship in October with an introductory price of $149 until January. The updated version incorporates a new user interface, full NeXT color support, and multiple-page capability. After January, the price will be $395. Contact Media Logic at 213/573-7575.

System board upgrades incorporating the Motorola 68040 chip for owners of the original 68030 cube increased from $1395 to $2495 as of November 1. NeXT announced the move several months in advance to allow users to upgrade before the price increase. The increase was necessary, according to NeXT, to reflect the product's "true cost."

Epitome shipped the beta of Redmark, a groupware product designed to allow users to proofread, edit, comment, and annotate documents. The long-awaited product is expected to ship in December for $285. Educational discounts and site licenses are available. Epitome: 615/675-0910.

The Dycam digital camera is being distributed by Prism Technologies of Sudbury, Ontario, with Prism software that stores up to 32 images, which are then transferred to the NeXT. The digital grayscale point-and-shoot camera weighs 10 oz., is cordless, rechargeable, and has automatic exposure and flash. The camera is available now for $995. Prism Technologies: 705/523-5528.

Reed College presented Steve Jobs with the Howard Vollum award for Distinguished Accomplishment in Science and Technology. He donated his $2000 prize to provide wages for students working in Reed's physics department. He was cited in part for "being the technological champion of liberal education." Jobs attended Reed College in the mid-1970s.

Pixel Magician, a universal picture file viewer

(SEE BRIEFS, NEXT PAGE)

BRIEFS continued

and translator for NeXT computers from Bäcchus Software Systems, was announced at Seybold. Working through the NeXT services menu, it will support PICTI, PICT II, TIFF, TGA, GIF, RAST, PCX, BMP, IFF, EPS, and MTV formats, among others. It will be available as of November 1 for $150. Bäcchus: 213/820-9145.

Lotus Development launched *Improv news, views and, clues*, a newsletter for users of its Improv product. The first issue was dated Summer 1991. According to Lotus, all users who register their copy of Improv receive the free newsletter automatically. Lotus: 617/693-7903.

FrameMaker 3.0 shipped on October 2, not in August as was erroneously reported in the September *NeXTWORLD Extra*. Its retail price was reduced from $995 to $795. Frame Technology: 408/433-3311.

The SAS Application System is now shipping on the NeXT computer. SAS is a large-scale data entry, storage, and manipulation system. It includes modules for report writing, statistical analysis, and project management. Unlike most personal computer software, the SAS System is licensed on a yearly basis. First year license fees begin at $825 and increase for each module added. Renewals are at a lower price. SAS Institute: 919/677-8000.

A compression and backup utility called Tarre started shipping from Aurora Software on October 1. The program is based on the UNIX tar and compress programs. It operates in a standalone mode and as a service within other applications. Tarre costs $29.95. Aurora Software: 608/231-3679.

***NeXTWORLD Extra* is a supplement of *NeXTWORLD* magazine. It is published monthly by Integrated Media, a subsidiary of IDG Communications, 501 Second St., San Francisco, CA 94107, and is distributed free to subscribers of *NeXTWORLD*. Lt. Sullivan's column and articles about unannounced NeXT products are reported and written by contributors without guidance from the *NeXTWORLD* staff.**

Editor: Dan Ruby; Manager: Darcy DiNucci; News Editor: Dan Lavin; Staff Writer: Simson L. Garfinkel; Layout: Sue Troy; Copy Editor: Eliot Bergson

Appsoft

[CONTINUED FROM PAGE 1]

version will be priced at $299. Buyers of the current version will receive the upgrade for free.

NeXT unbundled the full version of WriteNow from new systems sold after September 30, but the company continues to include with the machines a read-only version that can open WriteNow documents, including the on-line documentation for many existing NeXT applications, but not save or print them.

Pixelist is an image-editing program written by Keith Ohlfs, a NeXT employee and the developer of the bundled application Icon, on which Pixelist is partially based. Adams said that it would ship within about three months, and might be sold in two versions, one for high-end graphics applications and another for general users.

Similar in concept to Adobe Photoshop for the Macintosh, Pixelist includes more-extensive paint tools and a superior user interface, Adams said. Among its key features is Composite Lab, with which users can take advantage of NeXT's alpha channel color implementation to combine multiple images. Pricing has not yet been set.

According to Scott Shlecter of LEK, who will sit on Appsoft's board of directors, WriteNow and Pixelist are "the launching pad for a complete family of NeXTstep applications that will cover both all the tried-and-true software categories and compelling new stuff."

Appsoft was created in part because of NeXT's desire to find an outside publisher for WriteNow (see *NeXTWORLD Extra*, September 1991). Although some observers have commented that Appsoft appears to have a special relationship with NeXT, Adams said that he had not heard any complaints about unfair competition from other NeXT software developers.

"We are hitching our wagons to NeXT. We can do more for the platform than major publishers like Lotus and WordPerfect, which are simply porting their programs from other environments," he said.

In addition to Adams, Appsoft employees include Dan Rians, director of product marketing, and programmer Don Jordan, the author of Silicon Press for the Macintosh. Other top managers will be named soon, Adams said.

The company would not disclose details of its deal with NeXT or the amount of funding from LEK. "It is going to take a lot of money to open up this market," Shlecter said.

Appsoft Inc. is located at 300 Hamilton Ave., Palo Alto, CA 94301. 800/428-2777. ■

Apple/IBM

[CONTINUED FROM PAGE 4]

ented," and "best of breed," which are often associated with NeXT technology.

While some technologies produced by the alliance will be made available for licensing by other companies, "NeXT would have to bring something to the table," said Apple president, Michael Spindler.

IBM executives did not close the door on its possible use of NeXTstep. "It's not dead," said Bill Filip, vice president for workstations at IBM, but he termed the once-planned relationship "unlikely."

According to Filip, IBM would have liked to have used the NeXTstep on its machines as originally announced, but the two parties were unable to come to an agreement. He characterized the stumbling block as "principally a business issue." ■

HSD

[CONTINUED FROM PAGE 4]

keting for Abaton, evidently referring to NeXT's anticipated 3.0 update of its system software. Marlow explained that the company was unwilling to devote proper engineering resources to any needed upgrade.

HSD, by contrast, is committed to the NeXT market and is projecting more than $3.5 million in 1991 sales, according to company president Dave Peter. The company will bundle the modem with its OCR Servant character-recognition product at a price targeted to be under $500. Given OCR Servant's $295 price tag, Peter describes the deal as getting a fax modem "almost for free."

The fax modem will be available beginning November 1 exclusively through the NeXT worldwide dealer network. NeXT Connection will no longer carry the product. Peters declined to divulge specifics of his arrangement with Abaton.

Peter is actively seeking other products that fit with the company strategy of selling value-added peripherals. "We've made money in this market and we're looking to reinvest it," he said. ■

Virtuoso

[CONTINUED FROM PAGE 1]

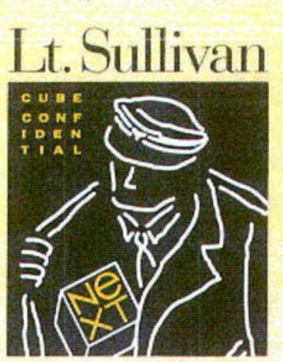
performance advantage." The company said that some Virtuoso operations were twice as fast as the same operations on FreeHand on a Macintosh IIfx. Alstys software engineer Mark Skaggs attributed the speed in part to new coding and in part to the faster processor of the NeXT system.

Virtuoso uses the same native file format as FreeHand, enabling files to be seamlessly traded across platforms. Virtuoso will also read Illustrator files from any platform, along with EPS and TIFF formats.

Missing from the NeXT product in this release is FreeHand's new ability (available in version 3.1) to use the Wacom Graphics Tablet for pressure-sensitive drawing effects.

Altsys is at 269 W. Renner Rd., Richardson, TX 75080. 214/680-2060; fax 214/680-0537. ■

Sullivan heeds new Agency directive: Just the facts



Crammed in his coach seat on the way back from NeXT's big Seybold week, Lt. Sullivan shook his head over the embarrassing revelations coming out of the Gates hearings. Seems the analysis boys over in Langley never let facts get in the way of an expedient opinion. No reason to slant the data in the NeXT dodge, he mused.

Sullivan was surprised during the show to run into Steve Jobs (NeXT), Bruce Henderson (Pages), and Paul Brainerd (Aldus) in deep and fervent conversation. Apparently, Brainerd regrets his hasty response to last year's request for help with the PageOne product. Jobs wants PageOne released with an Aldus label for reasons we all understand, but Pages isn't nearly as interested these days after accepting vulture capital backing.

There were some funny doings down at the booth, too. Tempers flared when Cube Technologies was prevented from showing the slide film back to its film recorder, apparently as a result of NeXT's "interpretation" of its Display PostScript license with Adobe that it covers output devices only up to 900 dpi. Another last-minute cancellation was Abacus's Executor Mac emulator. Maybe NeXT wasn't ready to face Apple's legal fury.

Borland has given the definitive word on the fate of PowerStep. After strong bidding from both Pages and Appsoft, the company has hired Joe Amirrato from the original PowerStep team to head Borland's spreadsheet development. Finally, someone with clout at Borland knows the true value of the PowerStep engine, and it looks like it will be used to improve Quattro. There might even be a release of Quattro for the NeXT platform.

Motorola is working hard on faster versions of the 68040 processor and should have something to give NeXT fairly soon. A Motorola engineer told Sullivan that future NeXT machines really would need to have 60-nanosecond RAM or better to take full advantage of the speed of this processor. Eighty ns would not allow memory access quickly enough to let the CPU give its best performance.

Then there are all the whispers circulating about NeXTstep and the Intel 80486. Selling NeXTstep in a shrinkwrapped box would open some eyes in the PC crowd, stimulating desire for NeXT's "real hardware" as well as making NeXTstep even more attractive to developers. The competition in the '486 marketplace is SCO's OpenDesktop and, next year, SunSoft's Solaris 2.0. Head to head against those guys, NeXTstep is the clear winner. The internal debate seems to favor making the plunge sometime next year.

It was a very interesting scene at the inaugural meeting of the California ISDN User Group. NeXT was much better represented than any other computer manufacturer, having infiltrated virtually the entire CIUG, a prestigious organization influencing the installation of ISDN services, setting of service rates, and establishment of ISDN technology standards. It looks like NeXT will have a representative on every subcommittee. Why all the interest in ISDN? Sullivan hears that NeXTstep 3.0 will offer the user a set of ISDN tools.

Finally, Sullivan made a note to call his broker about Sybase's now-public stock. Sources say the price for the database product (server and client) will almost double at the end of the year. Those in the know are snatching up Sybase as quickly as they can fill their purchase orders.

Help keep those intelligence estimates on the level. E-mail tips to the Lieutenant at sullivan@nextworld.com or call his voice mail at 415/978-3374. But don't call the Agency. They've got enough problems.

NeXTWORLD
EXTRA
DECEMBER 1991

NEWS IN BRIEF

ter Karnig left NeXT's Devel-
per Relations Group on
ovember 1 to become the new
neral manager of Appsoft Cor-
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andy Adams report to Karnig.

ained Glass Software in Octo-
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mputer. Existing customers
ill not be supported. Stained
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consultation services, a com-
ny representative said. Stained
lass: 415/968-5000.

eXT is developing an interface
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mpress programs, and a utility
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a word processor document.
troductory price is $99. Paget
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licrotech International is manu-
cturing a NeXT-labeled
movable hard disk drive for
elivery to a unnamed govern-
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Jobs discloses plans for IPO; lays off 30

by CLAIR WHITMER

Redwood City, CA – In back-to-back revelations last month, NeXT Computer announced the layoff of at least 30 employees while at the same time disclosing its intent to become a public company, possibly within 18 months.

Attributing the layoffs to changes in sales and marketing strategies that had bypassed some positions, NeXT let go of approximately five percent of its 600-employee work force. The cuts came from all areas of the company, including five people from the engineering department, usually a sacrosanct area in a start-up technology company.

A company spokeswoman said the cuts were related to third-quarter sales, which NeXT officials confirmed were disappointing (see story, page 3).

The company is "flirting with profitability," said NeXT CEO Steve Jobs, and a reduction in costs could make the bottom line more attractive. But, he added, the savings won't show up until next year [CONTINUED ON PAGE 3]

NeXT stepping over to 486-based machines

by LAURIE FLYNN

Redwood City, CA – Seizing an opportunity in the mainstream PC market, NeXT soon will make its NeXTstep operating system available for Intel 486-based computers, according to sources. The announcement is scheduled for early 1992.

The disclosure comes during a period of confusion created by the dissolution of the once mighty IBM/Microsoft alliance and IBM's subsequent realignment with Apple Computer. The offspring of that realignment, Taligent Corporation, is not expected to offer a product for at least two years. Likewise, Microsoft's Windows NT environment, part of the Advanced Computing Environment initiative, isn't expected to be fully object-oriented until late 1992 at the earliest.

Although he declined to comment specifically, NeXT CEO Steve Jobs hinted strongly that NeXTstep soon would become available on more-mainstream platforms than the Motorola-based NeXT computer. "A lot of our customers have told us that there is a lot of iron that they have already bought, and we have listened," said Jobs, speaking at Unix Expo in New York last month. The company confirmed that it is currently running NeXTstep successfully on four different processors in its labs. Some industry sources contend the company is also developing a version of NeXTstep for Sun SPARC systems.

A version of NeXTstep for 486-based [SEE INTEL, PAGE 4]

Estimated growth of 486-based PC market, worldwide

1990	146,000
1991	700,000
1992	1.9 million
1993	4.5 million

Source: IDC

Canon color printer engine may be NeXT-bound

by DAN LAVIN

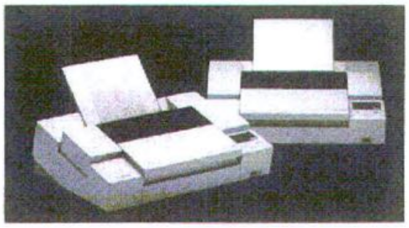
Las Vegas – Canon USA introduced a new printer engine at Comdex that may show up in a future NeXT color printer, according to sources.

In October, NeXT CEO Steve Jobs said that NeXT would use Canon color printer technology in a future product.

The new engine uses a bubble-jet ink-on-demand technology. While this method is not new, printers using similar technology typically cost tens of thousands of dollars. Canon printers using the new engine cost under $3000.

The mechanism includes four separate print heads sending between one and thirty-six drops of color at 360 dpi each. This yields one-pass printing and achieves the important goal of continuous-tone color. Also important is the printer's capability to print to plain paper.

Sources contend that 400 dpi is NeXT's minimum design goal for a color printer, which means that Canon would have to produce a special version for NeXT. According to Al Hebert, senior systems analyst at Canon, the engine would require more nozzles to achieve this resolution. [SEE CANON, PAGE 4]



Canon's new printers may be the basis for NeXT upcoming color printer.

OOP vendors prep for battle

by SIMSON L GARFINKEL

New York – If the recent Unix Expo was any indication, the industry's premier operating system vendors are gearing up for a battle royale over object-oriented technology.

In a keynote address that ran 45 minutes over schedule, NeXT CEO Steve Jobs asserted that commercial users are buying UNIX workstations to develop "mission-critical custom applications" that are beyond the scope of what is possible on Macintosh or MS-DOS computers. These companies are now discovering that object-oriented programming can reduce the time it takes to develop such a program from two years to just 90 days, he said.

The proven power of object-oriented programming explains why companies like Apple and IBM are now trying to develop new object-oriented operating systems, said Jobs. "The problem is that it takes five to six years to develop a new system," he said. "I saw Microsoft try to copy the Macintosh. It took them eight years."

But when asked why companies desiring object-oriented systems shouldn't [SEE UNIX EXPO, PAGE 4]

INTERVIEW

Rich Page looks ahead

NeXTWORLD *Senior Editor Simson L. Garfinkel recently visited NeXT Vice President of Hardware Engineering Rich Page for a spirited interview on NeXT's plans for evolving its technology, its role in the computer industry, and its relationships with suppliers.*

Processors

NW: What do you see as the growth potential for the 68K processor family? I've been told that the problem with the 68K is that it's a CISC machine and it's going to cost more and more to make it run faster. And Motorola is going to be more interested in doing something with the RS/6000. People think that NeXT's best deal is to stay with the 68K for a year or two and then go to RS/6000 or SPARC.

RP: You have one of two choices: Go with a unique processor and choose it for technical advantages, and then use those advantages to differentiate yourself in the market; the other way you can go is to pick one of the processors commonly used in the marketplace and then pick something else to differentiate yourself, so you aren't a "me-too."

You have problems no matter which way you go.

NW: Well, is there an eventual problem with the 68K? Will NeXT have to switch off it at some point?

RP: I think that the answer there is maybe. Presently, the 68K offers us the best price/performance for available processors. We just think that it's faster and cheaper than the alternatives, but that may not hold up. So then the question is, what do you switch to? You've got to find something that has a better cost/performance trade-off, and something that has a future to it. A year or two ago, you might have been inclined to pick MIPS. Yet if you'd done that, today you would be asking yourself, "Why did I pick MIPS? It looks like they're going out of business."

NW: That basically leaves SPARC, 88K. . .

RP: It's Intel, Motorola, SPARC, Power-PC, and MIPS, and that's your choice. And Motorola has two choices: 68K and 88K.

> *I think that what people want is the ability to carry their NeXTstation around and use it when they get there.*

NW: And you don't want to go with Intel, because. . .

RP: You jump from one CISC machine to another. And they charge you extra for DOS compatibility; it's a known fact. So you're left with 68K, 88K, SPARC, Power-PC, and MIPS.

NW: How do you make that decision?

RP: You pick the one that you think is best, and you make the best product that you can. But presently, it looks like the 68K is the cheapest in its class of performance for a reasonable period of time.

Presently, we have the only working product in the sub-$5000 range. IBM was supposed to ship a RS/6000 this fall for under $5000, and there was an announcement a month ago that they've slipped it out a year. HP had a similar announcement. In terms of a complete stand-alone machine – hardware, software, monitor, keyboard, disk – I believe that NeXT is the only company shipping a workstation for less than $5000. Everybody else leaves out something. They either leave out memory, or they leave out the disk.

Keyboards

NW: Everybody hates the new keyboard. What are you going to do about it?

RP: Well, in the long run we'll probably change our keyboard, and hopefully people will like that. Sometimes you make improvements and people don't like them, because they don't like any change. What happened on this one was that in the process of internationalizing and solving certain problems, we caused certain problems – like moving the backslash and the pipe for the UNIX folks. That was probably a mistake. Hopefully we can fix that in the future.

NW: What about third-party keyboard support, like Apple Desktop Bus keyboards? Are there plans to make them work?

RP: Maybe.

The optical disc

NW: Let's talk about the optical disc. Was that a mistake?

RP: Probably. . .

Basically, what happened was that the combination of the Winchester and the optical disc made a good product, but it was too expensive. And the optical-only system didn't work very well. So we ended up with a system that was too expensive and not fast enough. That's why we went and did our present set of products.

But there's another part to it. The thing that was nice about the optical disc was that it was roughly the same size as the 330MB Winchester. That made it very easy for customers to load a new operating system onto the disk or to back up the operating system.

Unfortunately, what people wanted was a Winchester and floppies. Most customers don't care that it might take 30 floppies or more to load their Winchester. What this tells me is that most customers, even educated ones, really don't pay attention to the backup problem.

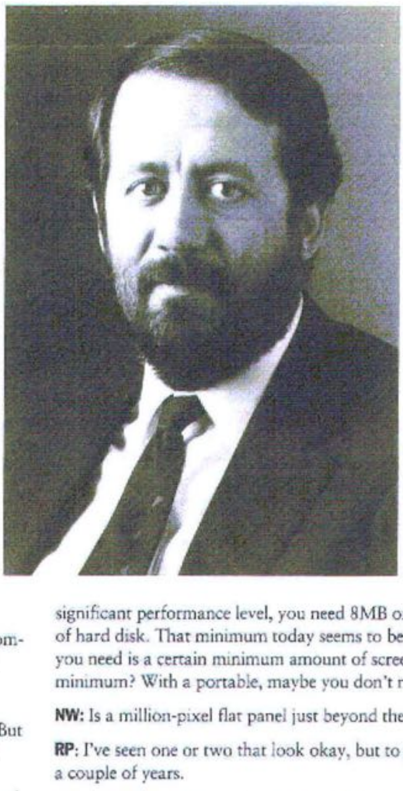
Japan and laptops

NW: You spend a lot of time in Japan. How is your relationship with Canon working out?

RP: It's working out fairly well. We have a good relationship with Canon. It has gotten to the point that they're an investor, a supplier, and our sales force for Japan and the Far East.

NW: Do they do any design work?

RP: Well, they design their own products, some of which we buy, like the laser printer. They made a contribution to the Kanji system. That's [NeXTstep] 2.1J.



NW: What about other Japanese suppliers?

RP: Unfortunately, we buy a fair amount of product out of Japan. It's the only place to get certain things – like memory. We get a fair amount of our memory from Motorola, but we can't get all of our memory there.

NW: They don't make enough?

RP: Yeah, and I don't think that we want to be sole-sourced for memory. And unfortunately, if you want to go looking for a flat-panel display or a number of other products, there isn't any other place you can look.

NW: Does that mean that you're working on a laptop?

RP: We're looking for a display. It's something that we're looking into but haven't really made any progress on.

NW: What are the real issues in bringing a NeXT portable to the market?

RP: The biggest issue is this: Presently, to build a NeXTstep computer, you need a significant performance level, you need 8MB or more of memory, you need a certain amount of hard disk. That minimum today seems to be around 100MB. And then the other thing you need is a certain minimum amount of screen real estate. Now the question is, what's that minimum? With a portable, maybe you don't necessarily need a million pixels.

NW: Is a million-pixel flat panel just beyond the state of the art right now?

RP: I've seen one or two that look okay, but to get a good-quality display will probably take a couple of years.

NW: Let's say two years from now NeXT brought out a portable. How much would it cost?

RP: Well, there are some portables available today. Matsushita built a SPARC laptop [that's distributed only in Japan], and Sony built a News laptop. None of these machines are truly portable, [because] you need to find an outlet or a Sears Die Hard battery. And the displays are fairly poor quality – they have megapixel displays, but they're passive, and the screen response is very low. So if you could get by with that level of screen quality, it would be possible to build one today. But I don't think that either company has sold many because the screen quality is so poor. Unless you absolutely had to have a portable, I don't think you'd be attracted to it. Actually, it surprised me that Sony shipped that kind of display.

NW: For NeXT, what would you want in a portable? Would you want it to weigh six pounds and run five hours on batteries?

RP: Well, I think we're going to have to shoot for something like the Sony News portable workstation, but with a better-quality display. And I don't think that operating on batteries is that important. I think that what people want is the ability to carry their NeXTstation around and use it when they get somewhere. Transportability is the important issue.

NW: And what would you want to see as a price on the machine?

RP: As cheap as possible, but it's going to be expensive. ◆

eXT forecasts strong growth, despite Q3 softness

CLAIR WHITMER

dwood City, CA – NeXT mputer is forecasting at least 40 – $150 million in sales for year, despite a soft third arter, a figure that will more an quadruple their reported 90 sales of $29 million.

"We believe that we will beat 40 million. We feel we're doing y, very well," said NeXT CEO ve Jobs.

At Unix Expo in New York t month, Jobs said he antici- ites sales of $60 million for the arth quarter, compared with 1 million for the first half of year. The company will not close sales for the third quar- , which closed in September. t if the $60 million figure is urate, then the company expe- nced a drastic decline in sales the third quarter.

Analysts expressed skepticism out NeXT's projected quar- ly figures.

"There's no way they're ng to go from $15 million to 0 million in a quarter," said alyst David Card at Interna- nal Data Corporation West of ountain View, California. One w is that NeXT booked third- arter deliveries in the second arter to beef up its second- arter results, which it had all ng planned to make public.

Card pointed out that Sun crosystems also reported a appointing third quarter in ms of unit sales, which com- ny executives attributed to creased sales in the commer- l market.

A NeXT spokesperson later rified Jobs's public statement, ing $60 million was optimistic the fourth quarter, while 40 – $150 million for the year a low-ball estimate. This uld bump up the range of pos- le third-quarter sales.

NeXT Director of Marketing ke Slade said that fourth quar- looks "a lot stronger" than rd quarter, conceding that the rd quarter was "flat, even a tle soft."

"I think you will see that the dustry as a whole had a disap- inting third quarter," said bs, while adding that any arith- tic based on the $60 million ure may be misleading.

Speculation about third-quar- results aside, if the company ps $140 for the fourth quarter, hich closes in December, the overall growth impression would be fairly impressive, according to analysts. This is exactly the kind of financial picture that NeXT needs to project if it is to pursue plans of going public.

"If they were selling in that range and were to confirm it to us, that would put them on our list," said Paul Cubbage, principal analyst at Dataquest. The company publishes a yearly list of the six top-selling workstation companies. ◆

IPO/layoffs

[CONTINUED FROM PAGE 1]

because of severance expenses.

NeXT had hired approximately 300 people during the past 18 months, a period that saw the NeXT system positioned as a "PC on steroids," said Jobs. But sales analyses soon demonstrated that the machine was being purchased by medium and large corporations for "mission-critical custom apps," he added.

This meant that some of the people hired for the original strategy were no longer mission-critical for NeXT.

Though layoffs are always problematic, most analysts seemed nonplused by the announcement. "Thirty people is just about the right proportion compared with what the industry is experiencing," said Darcy Fowkes, a research manager at International Technology Group in Los Altos, California.

After the layoff decision had been made, but before it was announced, Jobs unexpectedly confirmed that the company intends to go public.

"We're definitely going to go public within 12 to 18 months. And the reason is that our customers want us to," said Jobs at a press conference at Unix Expo last month.

The spokesperson said Jobs had meant the statement as an off-the-cuff confirmation of a common assumption, but it served to soothe anxieties caused by the layoffs. ◆

— Dan Lavin contributed to this story.

RightBrain prepares four utilities

by RICK REYNOLDS

Palo Alto, CA – Right Brain Software has developed four products to ship by the end of December, including three utilities spun off from the development of Paste Up, its forthcoming page-layout program, as well as a screen saver.

Developed from Paste Up, Rulers is a utility that enables users to resize, scale, and join rulers, allowing for clean and efficient sizings, alignments, and centerings. Portfolio acts as an extension of the shelf in the Workspace Browser, while the LaunchPad utility is a similar extension of the Dock.

LockScreen functions as a user-configurable screen saver and works in monochrome or color mode. The utility also can seal a workstation from curious passerbys by requiring a password.

Each program is $99, although site licensing can bring the prices as low as $30 per machine. RightBrain Software is at 132 Hamilton Ave., Palo Alto, CA 94301. 415/326-2974 or 800/472-7246. ◆

New books from Addison-Wesley

Addison-Wesley will begin publishing this month five books in the *NeXT Developer's Library*, including:

NeXTstep Reference – A guide to the NeXTstep development environment. (1008 pages, $44.95, ISBN 0-201-58136-1).

Sound, Music, and Signal Processing on a NeXT Computer: Concepts – A guide to the concepts and design of sound and music software. (512 pages, $39.95, ISBN 0-201-58146-9).

Sound, Music, and Signal Processing on a NeXT Computer: Reference – A detailed reference to the API for each piece of sound, music, and DSP software. (512 pages, $39.95, ISBN 0-201-58131-0).

NeXT Operating System Software – A description of Mach, the version of UNIX used by the NeXT. (240 pages, $24.95, ISBN 0-201-58131-0).

NeXT Development Tools – A description of the tools available for developing a NeXT application, including the NeXT editor, compiler, preprocessor, and debugger. (336 pages, $26.95, ISBN 0-201-58132-9).

WSJ ads test OOP strategy

THE IBM/APPLE ALLIANCE WILL PUT POWERFUL SOFTWARE ON YOUR DESK IN THREE YEARS.
CALL NOW FOR A FREE DEMONSTRATION.

by ELIOT BERGSON

Mountain View, CA – NeXT Computer unveiled a new, two-tier advertising and marketing strategy in October and November specifically designed to "leverage on the media Apple and IBM have gotten" from their recent announcement to develop an object-oriented operating system, according to Karen Steele, NeXT's marketing/communications manager.

Previous advertising efforts centered on the arrival of new products for the NeXT, such as WordPerfect or the Motorola 68040 chip. The current strategy, developed and implemented with CKS Partners in San Francisco, focuses on the NeXTstep user interface, which allows users to develop custom, object-oriented applications in a very short time.

In the first phase, ads that ran for six weeks in the *Wall Street Journal* targeted decision-makers in business and finance. "We're building an awareness campaign – awareness through viability. We have customers with success stories, and we want to get that out," said Steele.

The ads included an 800 number readers could call for more information. Callers are told of a series of seminars, scheduled through resellers and regional sales offices, to give potential customers hands-on experience with the machine.

The strategy seems to be paying off. "About 40 percent of our calls are what we call "qualified leads," customers ready to buy within the next three months," said Steele. "We're getting responses in financial services, higher education, government, publishing. . . even legal and medical are up."

The second phase of the campaign was launched in mid-November. Ads targeting programmers and MIS managers appeared in *Unix Today*, *Communications World*, and *PCWeek*, specifically designed to "go into the details of object-oriented programming for those who understand it best," said Steele. ◆

Expo registration opens

by CLAIR WHITMER

San Francisco – Registration pricing has been set for the upcoming NeXTWORLD Expo, to be held January 22–24, 1991, at the Civic Auditorium here.

Hosted by NeXT Computer, *NeXTWORLD* Magazine, and World Expo Corporation, the conference will combine a two-day trade show and user conference with a developer's conference on the third day.

Advance registration for the trade show is $25. For $95, users can register for the full user conference, including keynotes and panel discussions. After December 30, prices will increase to $40 and $150, respectively.

The developer's conference, for registered NeXT developers only, costs $395. After December 30, the price will increase to $495.

The expo is expected to draw more than 5000 professionals from around the world.

In the keynote address, NeXT CEO Steve Jobs will outline future NeXT technology and strategies. Other speakers from NeXT, third-party developers, and user groups will address technology and marketing concerns. Users will also be able to gather practical tips and techniques during the user track.

To register, or for more information, call World Expo Corporation at 800/545-EXPO. ◆

BRIEFS Continued

ber of NeXT workstations, the agency required NeXT to supply a storage device with a fully removable drive mechanism. Microtech designed, tested, and shipped the product for NeXT in only 90 days, sources at the two companies said. NeXT is considering whether to put the drive on its standard parts list.

Vivid Publishing has chosen RightBrain Software to market its TypeView program, a stand-alone utility that allows a user to easily view any single character or entire character set of a font. Extra information such as the number of kerned pairs or copyright information is also available. The Show Bezier option displays the internal construction of a character. The software is available for $129. RightBrain Software: 800/472-7246.

The Font Company's collection of 1500 PostScript Type 1 typefaces is no longer available in NeXT format. The Font Company is referring existing NeXT customers to a local user group. PostScript typefaces still are available from RightBrain Software and Adobe Systems. The Font Company: 602/998-9711.

A high-end accounting package for the NeXT is under development by Phoenix Data Trend, a Calgary, Alberta-based provider of time-sharing-based accounting services. The system, called Cornerstone, uses Syquest as its underlying relational database system. A stripped-down version will be available next May; the full system will be out in October 1992, according to Phoenix. Price for the full system should be about $5000. Phoenix Data Trend: 403/248-3282.

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NeXT gets high marks among education users

by DAN LAVIN

San Diego – NeXT's strong appearance at the Educom trade show in October suggests that interest in NeXT within universities is accelerating while at the same time narrowing into mathematically oriented departments.

According to Ronald Weissman, NeXT's director of strategic marketing, higher education still accounts for between 25 and 33 percent of sales worldwide.

"We are focusing on certain departments, but we are spending some time developing general relationships," said Weissman. "NeXT is already the number-two-selling computer at important campuses like Stanford and MIT."

The majority of new NeXT applications had a mathematical bent. Among them was a differential equations course from the University of Nebraska at Lincoln and a complete first-year curriculum in science, engineering, and mathematics from Rose-Hulman Institute of Technology, located in Terre Haute, Indiana. Among the commercial developers displaying new software was Maple Software, showing a math program. ◆

Intel

[CONTINUED FROM PAGE 1]

machines could open up NeXT's market to millions of PCs at both the workstation and server levels. By the end of 1991, the installed base of 486 machines will be about 850,000, according to Bruce Stephen, analyst at IDC in Framingham, Massachusetts.

"It's clear [Jobs] has to expand his hardware base," said one industry analyst. "If he stuck only to the Motorola he'd have a problem if he wanted to be in the mainstream."

The real question is whether customers of Intel machines would be interested. According to one analyst, that will depend on the customer's application. "If customization is the real issue, probably, but if backward compatibility is the issue, probably not."

The strategy is consistent with NeXT's new emphasis on its object-oriented system software, rather than its hardware. "We believe, and we have been told by our customers, that our system software is one of the most important competitive advantages that we have," said Mike Slade, NeXT's director of marketing. ◆

Canon

[CONTINUED FROM PAGE 1]

But, Hebert added, operating at 400 dpi and driven by an external PostScript processor, the printers could achieve quality levels required for some final production and service-bureau applications.

At the show, Canon introduced two Canon-branded printers for the PC and Mac, based on the engine. ◆

Unix Expo

[CONTINUED FROM PAGE 1]

just use NeXTstep today, Bill Filip, president of IBM's advanced workstation division, attacked NeXT's technology as not being truly object-oriented.

"NeXTstep is implemented as a layered-object technology approach; it's the same approach as OS/2 and System 7," Filip said. "Pink is a ground-zero object structure. We believe it will be more productive by optimizing object technology down to the microkernel. . . . The [Pink] kernel is object-oriented. Today, no kernel is an object."

In another press conference a few hours later, Jobs responded: "Sometimes, technical people don't understand the depth of what they are talking about. NeXTstep uses Mach. It's a full object-oriented system."

NeXTstep has at least one leg up over Taligent, the company formed by IBM and Apple to offer an object-oriented environment: availability. Apple Computer President Michael Spindler said that the company would not be showing its object-oriented Pink operating system until 1992 – and then only to select, undisclosed customers.

"We will show Pink when System 7 is [moved] to RISC," said Spindler, referring to the company's plans to port its System 7 operating system to the new Power-PC RISC microprocessor currently under joint development by IBM and Motorola.

Within the next two years, Taligent will make part of its object-oriented system available "in a layered form, to enhance existing products," Filip said. ◆

'Deep' encounter in a DC parking garage

Lt. Sullivan

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NeXT

Expo fever is running high enough to overcome any chill caused by layoffs or third-quarter results. Even the normally skeptical Sullivan let those details roll off his back. Now the IPO, that will be interesting. Foremost in his mind, though, as he rolled his unmarked Agency sedan to an isolated corner on the third floor of the D.C. parking garage, were the rampaging rumors about NeXTstep on other platforms.

A tall figure in a trenchcoat stepped out of the shadows. Forget about the RS-6000, he said. SPARC is iffy at best. But developers and users would be wise to start thinking about NeXTstep on the 80486. Like, for example, how do you ship an app for more than one platform? Do you need separate packaging, or perhaps separate disks, for the different binaries? Sullivan's source says no. Multiple binaries could fit in the same app wrapper. The user sees one file. The machine knows which part of the code to run.

Sounds like nirvana for users with a big '486 installed base. But it's not that simple. Only '486 machines equipped with special graphics buffers will handle NeXTstep's graphics routines. Only a few installed machines are so equipped, but a handful of Intel clone makers may be working on special NeXTstep boxes.

Sullivan has been unable to nail down whether or not Developer Conference attendees will get NeXTstep 3.0 betas at NeXTWORLD Expo. NeXT isn't certain it can handle full beta distribution at this early stage. In any case, the conference will function as a "3.0 camp" in many ways. If betas do ship, they'll come on CD-ROM, so get yourself a SCSI CD-ROM drive for your NeXT. You can wait for a NeXT-specific drive, but there is also an inelegant solution. Buy an AppleCD SC drive and hook it up to your NeXT computer. It works better with NeXT than with a Macintosh anyway.

So what do you get with this new version of the operating system anyway? A lot. Support for PostScript Level 2 (with your own NeXT look-up table in the CIE color space). Pantone Matching System. A new API for the digital signal processor (Motorola 56001 DSP) chip. Support for 1.4MB Macintosh floppy disks. And a lot more.

Create a successful computer, and great games will inevitably follow, regardless of the thousands of MIS managers who would swear otherwise. In the past several months, both commercial and shareware entries have appeared, and Sullivan knows of more in development. Athena is planning to release the 1991 version of Culture Shock in January. While Lighthouse will not do any follow-up to Void, Sullivan was delighted to get a sneak preview of a color version of the in-progress Ragnarok. Other games are in development from MIT to Stanford.

Cash on the barrelhead? Well, not always. Even credit-hostile NeXT has had to face up to the fact that large corporations won't buy on a cash-in-advance basis, so it has begun quietly extending credit to select customers. If you're not among them, ask your NeXT salesman for a credit application anyway. Although NeXT does not publicize the availability of terms, a credit application is available from the finance department upon request.

While Apple ships a Motorola 68030 emulator with all 68040-based machines, NeXT has bitten off a bigger bite. Insignia Solutions has been retained to write a Motorola-680x0 emulator for NRW. While NRW (as in "NeXT RISC Workstation") is not expected until late in "92, when it does come there will be a workaround for software to support the RISC machines. Insignia, famous for DOS emulation, seems like just the right solution for this task.

While Ashton-Tate's PowerStep was only a cult favorite as a commercial spreadsheet product, it seems to have found more-ardent admirers now that its in exile at Borland. Both Pages Corporation of San Diego and Appsoft Corporation of Palo Alto have been attempting to snap it up. Pages sees PowerStep as the foundation of a nice charting package for PageOne. Appsoft envisions a traditional spreadsheet for the mainstream business market who don't like newfangled paradigms and fixing things that weren't broken. So far, Lt. Sullivan hasn't been able to tell how things will end, but it is very possible Borland has its own, non-NeXT uses for the PowerStep technology.

Sullivan jotted down this last tip, then looked up for more, but Deep NeXT had already disappeared.

Sullivan plans on making the rounds of Expo parties, and he is busy planning his own underground event. The best way to get your invite is to first share your tips with him by sending email to Sullivan@nextworld.com or calling his voicemail at 415-978-3374. Don't call the Agency, though. No reason to tip off the bean counters about those party expenses.